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TRANSACTIONS

OF THE

COLLEGE OF PHYSICIANS

OF

PHILADELPHIA

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THIRD SERIES

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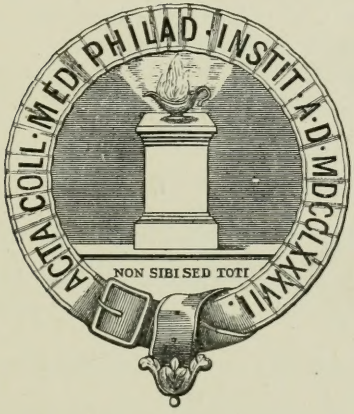

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PHILADELPHIA
PRINTED FOR THE COLLEGE
1920

NOTICE

The present volume of TRANSACTIONS contains the papers read before the College from January, 1920, to December, 1920, inclusive.

The Committee of Publication thinks it proper to say that the College holds itself in no way responsible for the statements, reasonings, or opinions set forth in the various papers published in its TRANSACTIONS.

EDITED BY

WALTER G. ELMER, M.D.

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"This volume is published in part by the income from the Francis Houston Wyeth Fund."

DORNAN, PRINTER

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LIST

OF THE

PRESIDENTS OF THE COLLEGE FROM THE TIME OF ITS INSTITUTION

ELECTED	
1787	JOHN REDMAN
1805	WILLIAM SHIPPEN
1809	ADAM KUHN
1818	THOMAS PARKE
1835	THOMAS C. JAMES[1]
1835	THOMAS T. HEWSON
1848	GEORGE B. WOOD
1879	W. S. W. RUSCHENBERGER
1883	ALFRED STILLÉ
1884	SAMUEL LEWIS[2]
1884	J. M. DA COSTA
1886	S. WEIR MITCHELL
1889	D. HAYES AGNEW
1892	S. WEIR MITCHELL
1895	J. M. DA COSTA
1898	JOHN ASHHURST, JR.
1900	W. W. KEEN
1902	HORATIO C WOOD
1904	ARTHUR V. MEIGS
1907	JAMES TYSON
1910	GEORGE E. DE SCHWEINITZ
1913	JAMES CORNELIUS WILSON
1916	RICHARD H. HARTE
1919	WILLIAM J. TAYLOR

[1] Died four months after his election.
[2] Resigned on account of ill-health.

COLLEGE OF PHYSICIANS OF PHILADELPHIA

1920

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EDWARD B. KRUMBHAAR, M.D.

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JOHN A. BOGER, M.D.

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HENRY K. DILLARD, JR., M.D.

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(until February, 1923)

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(until February, 1921)

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JOHN B. DEAVER, M.D.

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Clerk, J. MILTON GRISCOM, M.D.

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Clerk, NATHAN P. STAUFFER, M.D.

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MEDICAL HISTORY—*Chairman*, FRANCIS R. PACKARD, M.D.
Clerk, H. R. M. LANDIS, M.D.

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Clerk, WM. EGBERT ROBERTSON, M.D.

FELLOWS

OF THE

COLLEGE OF PHYSICIANS OF PHILADELPHIA

DECEMBER, 1920

* Non-resident Fellows.
† Fellows who have commuted dues.

ELECTED

1912. Addison, William H. F., A.B., M.D., Professor of Normal Histology and Embryology in the University of Pennsylvania. Medical Laboratories, University of Pennsylvania.

1905. Adler, Lewis H., Jr., M.D., Professor of Diseases of the Rectum in the Philadelphia Polyclinic and College for Graduates in Medicine; formerly Prosector to the Professor of Anatomy in the University of Pennsylvania; Consulting Surgeon to the Charity Hospital. 1610 Arch St.

1914. Aiken, Thomas Gerald, M.D., Assistant Visiting Physician to the Chester County Hospital, West Chester, Pa.; Pathologist to the Country Branch of the Rush Hospital for Tuberculosis. Berwyn, Pa.

1913. Alexander, Emory G., M.D., Surgeon to St. Christopher's Hospital for Children; Associate Surgeon to the Episcopal Hospital; Clinical Professor of Surgery in the Woman's Medical College of Pennsylvania, Demonstrator of Fracture Dressings in the Jefferson Medical College, and Assistant Surgeon to the Kensington Hospital for Women 1701 Spruce St.

1906. Allen, Francis Olcott, Jr., A.B., M.D., Surgeon to the Presbyterian and the Children's Hospital; Assistant Surgeon to the Bryn Mawr Hospital; Surgeon to the Out-patient Department of the Pennsylvania Hospital. 2216 Walnut St.

1896. Allyn, Herman B., M.D., Physician to the Philadelphia General Hospital. 2044 Chestnut St.

ELECTED

1888. Anders, James M., M.D., L.L.D., Professor of Medicine and Clinical Medicine in the Medico-Chirurgical College; Officer de l'Instruction Publique. 1605 Walnut St.

1905. Anspach, Brooke M., M.D., Associate in Gynecology in the University of Pennsylvania; Gynecologist and Obstetrician to the Philadelphia General and the Stetson Hospitals; Assistant Gynecologist to the University Hospital; Attending Gynecologist to the Bryn Mawr Hospital. 1827 Spruce St.

1905. Appleman, Leighton F., M.D., Demonstrator of Pharmacy and Materia Medica, and Instructor in Therapeutics in the Jefferson Medical College; Associate Professor of Ophthalmology in the University of Pennsylvania Graduate School of Medicine; Assistant Surgeon to the Wills Eye Hospital; Ophthalmologist to the Frederick Douglass Memorial Hospital and to the Burd School. 308 S. Sixteenth St.

1906. Ashhurst, Astley Paston Cooper, A.B., M.D., Instructor in Surgery in the University of Pennsylvania; Associate in Surgery in the University of Pennsylvania; Surgeon to the Episcopal Hospital and to the Philadelphia Orthopædic Hospital and Infirmary for Nervous Diseases. 1629 Spruce St.

1893. Ashton, Thomas G., M.D., Physician to the Philadelphia General Hospital. 1814 S. Rittenhouse Square.

1920. Astley, George Mason, M.D., Assistant Surgeon, Samaritan Hospital. 5317 Master St.

1914. Austin, J. Harold, B.S. (Univ. of Penna.), M.D., Department of Research Med., University of Pennsylvania. Ardmore, Pa.

1906. Babbitt, James A., A.B., (Yale), A.M. (Haverford), M.D., Professor of Hygiene and Physical Education at Haverford College; Assistant Laryngologist and Aurist, and Chief of the Out-patient Department for Diseases of the Nose, Throat, and Ear at the Lankenau Hospital; Assistant Instructor in Otology in the University of Pennsylvania; Laryngologist to the Out-patient Department of the Children's Hospital. 1901 Chestnut St.

1910. Baer, Benjamin F., Jr., B.S., M.D., Associate Professor of Ophthalmology; Post-graduate School of Medicine, University of Pennsylvania; Instructor in Ophthalmology, Medical Department, University of Pennsylvania; Assistant Ophthalmologist, University Hospital; Ophthalmologist, St. Agnes' Hospital. 2039 Chestnut St.

ELECTED

†1892. Baker, George Fales, B.S., M.D. 1818 Spruce St.

1911. Baldwin, James Harvey, A.B., M.D., Assistant Surgeon to the Methodist Hospital. 1426 Pine St.

1889. Baldy, John Montgomery, M.D., Professor of Gynecology in the Philadelphia Polyclinic; Surgeon to the Gynecean Hospital; Consulting Surgeon to the Jewish and the Frederick Douglass Memorial Hospitals. 2219 De Lancey Place.

1916. Balentine, Percival L., M.D., Assistant Surgeon, Wills Eye Hospital; Demonstrator of Ophthalmic Surgery in the Philadelphia Polyclinic. 302 Weightman Building, 1524 Chestnut St.

1898. Balliet, Tilghman M., A.M., M.D., Professor of Therapeutics at Dartmouth College, Hanover, N. H.; Physician to the Old Man's Home. 3709 Powelton Ave.

1911. Barnard, Everett P., M.D., Obstetrician to the Maternity Hospital; Assistant Instructor in Obstetrics in the University of Pennsylvania. 119 S. Nineteenth St.

1883. Baum, Charles, A.M., M.D., Ph.D. 1828 Wallace St.

1908. Beardsley, Edward J. G., M.D., L.R.C.P. (Lond.), Assistant Professor of Medicine in the Jefferson Medical College; Chief Clinical Assistant in the Out-patient Medical Department of the Jefferson Medical College Hospital; Assistant Physician to the Jefferson Hospital. 258 S. Sixteenth St.

*1916. Bell, William Hemphill, M.D., Captain, Medical Corps, U. S. Navy, Commanding U. S. Naval Hospital, Portsmouth, N. H.

*1896. Beyea, Henry D., M.D. Roanes, Va.

*1903. Biggs, Montgomery H., M.D., Surgeon to the Rutherford Hospital; Chief Surgeon of the Carolina, Churchfield and Ohio Railway. Rutherfordton, N. C.

1918. Billings, Arthur E., M.D. 1703 Spruce St.

1917. Birdsall, Joseph C., A.B., A.M., M.D., Urologist, Polyclinic Section of the Medico-Chirurgical College and Hospital Graduate School of Medicine of the University of Pennsylvania; Chief of the Genito-urinary Dispensary and Assistant Genito-urinary Surgeon, Presbyterian Hospital; Instructor in Surgery, University of Pennsylvania. 4610 Spruce St.

1908. Bland, Pascal Brooke, M.D., Chief Clinical Assistant in the Gynecological Department of the Jefferson Medical College Hospital; Instructor in Gynecology in the Jefferson Medical College; Gynecologist to St. Joseph's Hospital; Assistant Gynecologist to the Philadelphia General Hospital. 1621 Spruce St.

ELECTED

1917. Block, Frank B., A.B., M.D., Surgeon to the Jewish Hospital; Instructor in Gynecology in the University of Pennsylvania; Surgeon, Jewish Hospital. 2035 Chestnut St.

1894. Bochroch, Max H., M.D., Neurologist to the St. Joseph's and Jewish Hospitals; Physician to the Psychopathic Wards of the Philadelphia General Hospital. 1539 Pine St.

1896. Boger, John A., A.M., M.D., Surgeon to St. Mary's Hospital; Surgeon to the Stetson Hospital; Surgeon to the Dispensary of the Episcopal Hospital. 2213 N. Broad St.

1910. Boice, J. Morton, A.B., M.D., Physician to the Home of the Merciful Savior for Crippled Children. 4020 Spruce Street.

1911. Bonney, Charles W., A.B., M.D., Associate in Topographic and Applied Anatomy in the Jefferson Medical College. 1117 Spruce St.

1913. Boston, L. Napoleon, A.M., M.D., Professor of Physical Diagnosis in the Medico-Chirurgical College; Physician to the Philadelphia General Hospital; Pathologist to the Frankford Hospital. 2024 Chestnut St.

1919. Bowen, David Ralph, M.D. 82 W. Lacrosse Ave., Lansdowne, Pa.

1891. Boyd, George M., M.D., Professor of Obstetrics, Graduate School of Medicine, University of Pennsylvania; Obstetrician and Gynecologist to the Philadelphia Lying-in Charity; Obstetrician and Gynecologist to the Medico-Chirurgical Hospital. 1909 Spruce St.

1907. Boyer, Henry Percival, M.D., Neurologist to the Stetson Hospital; Physician to the Philadelphia Home for Incurables; Assistant Physican to the Orthopædic Hospital and Infirmary for Nervous Diseases. 4602 Baltimore Ave.

1907. Bradley, William N., Ph.G., M.D., Visiting Pediatrist to Howard Hospital; Visiting Pediatrist to Philadelphia General Hospital; Instructor in Pediatrics in the University of Pennsylvania. 1725 Pine St.

1903. Branson, Thomas F., M.D., Attending Physician to the Bryn Mawr Hospital. Rosemont, Pa.

1891. Brinton, Lewis, M.D., Physician-in-Chief to the American Hospital for Diseases of the Stomach. 1301 Medical Arts Bldg., Sixteenth and Walnut Sts.

1900. Brinton, Ward, A.M., M.D., Visiting Physician to the Tuberculosis Department of the Philadelphia General Hospital; Visiting Physician to the Hospital for Poor

ELECTED

Consumptives at White Haven, Pa.; Visiting Physician to the Philadelphia Jewish Sanatorium for Consumptives. 1423 Spruce St.

1917. Bromer, Ralph S., A.B. (Yale University), M.D., Roentgenologist to the Episcopal and the Orthopedic Hospitals. 1629 Spruce St.

1907. Brooks, Macy, A.B. (Princeton), M.D., Assistant Genito-urinary Surgeon to the Philadelphia General Hospital. 1321 Spruce St.

1919. Brown, H. MacVeagh, M.D., 4608 Baltimore Ave.

1919. Brown, Henry P., Jr., M.D. 1822 Pine St.

1916. Brown, Samuel Horton, M.D. 1901 Mt. Vernon St.

1887. Brubaker, Albert P., A.M., M.D., Professor of Physiology and Medical Jurisprudence in the Jefferson Medical College; Professor of Physiology and Hygiene in the Drexel Institute of Science, Art, and Industry. 3426 Powelton Ave.

1916. Buckley, Albert Coulson, M.D., Medical Superintendent, Friends' Hospital, Frankford; Associate Professor of Psychiatry, Graduate School of Medicine, University of Pennsylvania; Alienist to the Orthopædic Hospital and Infirmary for Nervous Diseases. Frankford, Phila.

1906. Burns, Stillwell C., M.D., Associate Professor of Surgery in the Graduate School of Medicine, University of Pennsylvanian. 1925 Spring Garden St.

1892. Burr, Charles W., M.D., Professor of Mental Diseases in the University of Pennsylvania; Neurologist to the Philadelphia General Hospital. 1918 Spruce St.

1906. Butler, Ralph, M.D., Professor of Diseases of the Nose and Throat in the Philadelphia Polyclinic and the College for Graduates in Medicine; Chief of the Dispensary for Diseases of the Ear at the University Hospital; Assistant Professor of Otology in the University of Pennsylvania; Laryngologist and Aurist to the Lankenau Hospital. 1926 Chestnut St.

*1908. Cadbury, William W., A.M., M.D., Canton Christian College, Canton, China.

†1907. Cadwalader, Williams B., M.D., Instructor in Neurology and Neuropathology, University of Pennsylvania, School of Medicine; Neurologist to the Presbyterian Hospital; Consulting Neurologist to the Bryn Mawr Hospital. 1501 Spruce St.

ELECTED

1905. Cameron, George A., M.D., Physician to the Germantown Hospital. S. E. cor. Schoolhouse Lane and Greene St., Germantown.

1905. Carmany, Harry S., M.D., Surgeon to St. Timothy's Hospital, Roxborough; Associate Surgeon of the Episcopal Hospital; Surgeon to the Dispensary of the Episcopal Hospital. 366 Green Lane, Roxborough.

1910. Carnett, John Berton, M.D., Professor of Surgery, Postgraduate Medical School, University of Pennsylvania; Associate in Surgery, Medical Department, University of Pennsylvania; Surgeon to Philadelphia General Hospital; Chief Surgeon to the American Stomach Hospital. 123 S. Twentieth St.

1905. Carpenter, Herbert B., M.D., Physician to the Dispensary of the Children's Hospital. 1805 Spruce St.

1895. Carpenter, John T., M.D., Attending Ophthalmologist to the Bryn Mawr Hospital. 2030 Chestnut St.

1917. Carson, John B., M.D. 1802 Pine St.

1892. Cattell, Henry W., A.M., M.D. 3709 Spruce St.

1900. Chance, Burton, M.D., Attending Surgeon to the Wills Eye Hospital; Consulting Ophthalmologist Eastern Pennsylvania Institution for the Feeble-minded and Epileptic; Ophthalmic Surgeon to the Pennsylvania Railroad Company. 1305 Spruce St.

1897. Cheston, Radcliffe, M.D., Visiting Physician to the Chestnut Hill Hospital; Consulting Physician to the Germantown Hospital, and to the Pennsylvania Institution for the Deaf and Dumb. Chestnut Hill.

1903. Chrystie, Walter, M.D. One of the Senior Physicians to Bryn Mawr Hospital. Bryn Mawr, Pa.

1899. Clark, John G., M.D., Professor of Gynecology in the University of Pennsylvania; Gynecologist-in-Chief to the University Hospital. 2017 Walnut St.

1896. Cleveland, Arthur H., M.D., Clinical Professor of Laryngology in the Medico-Chirurgical College; Laryngologist to the Medico-Chirurgical Hospital; Laryngologist and Aurist to the Presbyterian Hospital, and to Pennsylvania Institution for Deaf and Dumb. 256 S. Fifteenth St.

1910. Cloud, J. Howard, M.D., Assistant Physician to the Bryn Mawr Hospital; Attending Physician to the Children's House of Bryn Mawr Hospital. 11 W. Montgomery Ave., Ardmore, Pa.

ELECTED

1903. Coates, George Morrison, A.B., M.D., Professor of Otology, University of Pennsylvania, Graduate School of Medicine; Surgeon to the Out-Patient Department for Diseases of the Ear, Throat, and Nose of the Pennsylvania Hospital; Consulting Laryngologist to the Philadelphia Orphanage and to the Sharon Hospital. 1736 Pine St.

1908. Codman, Charles A. E., M.D., Physician to the American Oncologic Hospital. 4116 Spruce St.

1907. Cohen, Myer Solis, A.B., M.D., Pediatrist to the Jewish Hospital, and to the Sanatorium for Consumptives, Eagleville, Pa.; Director of the Jules E. Mastbaum Research Laboratory of the Jewish Hospital; Assistant Professor in Medicine, Graduate School of Medicine, University of Pennsylvania. 2113 Chestnut St.

1888. Cohen, Solomon Solis, M.D., Professor of Clinical Medicine in the Jefferson Medical College; Physician to the Jefferson Medical College Hospital, to the Philadelphia General Hospital, to the Jewish Hospital, and to the Rush Hospital. 1525 Walnut St.

1920. Cole, Charles J., A.B., M.D., Visiting Physician, Philadelphia Hospital for Contagious Diseases; Assistant Pediatrist, Polyclinic Hospital; Physician to Out-patient Department, Mary Drexel Home; Assistant Physician to Out-patient Department, Children's Hospital, University Hospital. Elkins Park, Pa.

1898. Coles, Stricker, M.D., Assistant Professor of Obstetrics in the Jefferson Medical College; Assistant Obstetrician to the Jefferson and the Philadelphia General Hospitals; Visiting Physician to the Philadelphia Lying-in-Charity Hospital. 2103 Walnut St.

*1901. Coley, Thomas Luther, A.B., M.D., Attending Physician Methodist Episcopal Hospital, Philadelphia. Bethayres, Pa.

1903. Coplin, W. M. L., M.D., Professor of Pathology in the Jefferson Medical College; Pathologist to and Director of the Laboratories of the Jefferson Medical College Hospital; Pathologist to the Philadelphia General Hospital and to the Friends' Asylum for the Insane, Frankford; Bacteriologist to the Pennsylvania State Board of Health. 606 S. Forty-eighth St.

1912. Copp, Owen, A.B., M.D., Physician-in-chief and Superintendent of the Pennsylvania Hospital for the Insane. Pennsylvania Hospital for the Insane, Forty-fourth and Market Sts.

ELECTED

1911. Cornell, Walter Stewart, A.B., M.D., Director of Medical Inspection of Public Schools of the City of Philadelphia; Chief of Medical Staff of the House of Detention; Lecturer on Osteology in the University of Pennsylvania. 729 City Hall.

1914. Corson, Edward Foulke, M.D., Assistant Dermatologist, Children's Hospital Dispensary; Chief Clinical Assistant in the Skin Dispensary, Jefferson Hospital. 2039 Chestnut St.

1907. Council, Malcolm S., M.D., Attending Physician to the Bryn Mawr Hospital; Attending Physician to the Cathcart Home at Devon. Bryn Mawr, Pa.

*1909. Craig, Alexander R., A.M., M.D., Sc.D. 535 N. Dearborn St., Chicago, Ill.

1904. Craig, Frank A., M.D., Instructor in Medicine in the University of Pennsylvania; Visiting Physician to the Henry Phipps Institute, University of Pennsylvania; Visiting Physician to the White Haven Sanatorium; Tuberculosis Consultant to the Presbyterian Hospital. 244 S. Twenty-first St.

1907. Crampton, George S., M.D., Attending Surgeon to the Eye Department of the Pennsylvania Hospital and the Philadelphia Hospital for Contagious Diseases; Assistant Surgeon to the Wills Hospital; Lecturer on Physiologic Optics in the Philadelphia Polyclinic and School for Graduates in Medicine; Ophthalmologist to the Philadelphia Orphanage. 1700 Walnut St.

1920. Creighton, William J., B.A., M.D., Assistant Ophthalmic Surgeon, Germantown Hospital and Dispensary; Assistant Dispensary Surgeon, Department Ophthalmology, University Hospital; Instructor in Ophthalmology, University of Pennsylvania Medical School. 1905 Chestnut St.

1920. Cross, George Howard, M.D., Ophthalmologist to the Chester Hospital. Chester, Pa.

1917. Cross, Sumner H., A.B., M.D., Physician to the Abington Memorial Hospital, Abington, Pa. 412 York Road, Jenkintown, Pa.

1904. Cruice, John M., M.D., Physician to the Henry Phipps Institute of the University of Pennsylvania; Physician to the Medical Dispensary of St. Agnes' Hospital; Instructor in Medicine in the University of Pennsylvania. 1932 Spruce St.

ELECTED

*1910. Cummins, W. Taylor, M.D., Pathologist to the Southern Pacific Hospital; Director of the Mary W. Harriman Research Laboratory, San Francisco, Cal.

1902. Currie, Charles A., M.D., Physician to the Germantown Hospital. West Walnut Lane, Germantown.

1896. Da Costa, John Chalmers, M.D., Professor of the Principles of Surgery and of Clinical Surgery in the Jefferson Medical College; Surgeon to the Philadelphia General and St. Joseph's Hospitals. 2045 Walnut St.

1887. Daland, Judson, M.D., Professor of Medicine in the Graduate School of Medicine, University of Pennsylvania. 317 S. Eighteenth St.

°1859. Darrach, James, M.D., Consulting Surgeon to the Germantown Hospital. Preston Apartments, Atlantic City, N. J.

1919. Davies, John R., Jr., M.D., 302 S. Nineteenth St.

1896. Davis, Charles N., M.D., Dermatologist to the Pennsylvania Hospital; Consulting Dermatologist to St. Agnes' Hospital; Assistant Physician to the Dispensary for Skin Diseases in the Howard Hospital. 1931 Spruce St.

1888. Davis, Edward P., A.M., M.D., Professor of Obstetrics in the Jefferson Medical College; Obstetrician to the Jefferson Hospital; Obstetrician and Gynecologist to the Philadelphia General Hospital; Consultant to the Preston Retreat. 250 S. Twenty-first St.

1916. Davis, Warren B., M.D., Oral Surgeon, Philadelphia General Hospital; Assistant Rhinologist and Otologist St. Agnes' Hospital; Assistant Demonstrator of Anatomy Jefferson Medical College; Clinical Assistant in Surgical Dispensary Jefferson Hospital. 135 S. Eighteenth St.

1900. Davisson, Alex. Heron, M.D. 4514 Springfield Ave.

1894. Deaver, Harry C., M.D., Professor of Surgery in the Woman's Medical College of Pennsylvania; Surgeon to the Episcopal Hospital, and to the Children's Hospital of the Mary J. Drexel Home; Surgeon-in-Chief to the Kensington Hospital for Women. 1701 Spruce St.

1887. Deaver, John B., M.D., D.Sc., LL.D., John Rea Barton Professor of Surgery, University of Pennsylvania; Visiting Surgeon, Hospital of the University of Pennsylvania; Surgeon-in-Chief to the Lankenau Hospital. 1634 Walnut Street.

1902. Dehoney, Howard, M.D. 240 S. Thirteenth St.

ELECTED

1885. Dercum, Francis X., A.M., M.D., Ph.D., Professor of Nervous and Mental Diseases in the Jefferson Medical College; Consulting Neurologist to the Philadelphia General Hospital; Foreign Corresponding Member of the Neurological Society of Paris, and Corresponding Member of the Psychiatric and Neurological Society of Vienna. 1719 Walnut St.

1908. Despard, Duncan L., M.D., Surgeon to the Abington Memorial Hospital; Assistant Surgeon to the Jefferson Medical College Hospital; Demonstrator of Clinical Surgery in the Jefferson Medical College; Associate in Gynæcology in the Philadelphia Polyclinic Hospital. 1806 Pine St.

1912. Dewey, J. Hiland, Ph.B., M.D., Assistant Surgeon to Wills Eye Hospital; Ophthalmic Surgeon to St. Francis' Hospital, Trenton, N. J. 1436 Diamond St.

*1911. Dickson, Frank D., M.D. 405 Waldheim Bldg., Kansas City, Mo.

1908. Dillard, Henry K., Jr., M.D., Physician to the Out-patient Department of the Pennsylvania Hospital; Physician to the Dispensary of the Mary J. Drexel Home. 234 S. Twentieth St.

1920. Diven, John, A.B., M.D., Pediatrician to St. Christopher's Hospital and Babies' Hospital of Philadelphia; Assistant Pediatrician to Presbyterian Hospital, 2038 Chestnut St.

1920. Doane, Joseph Chapman, M.D., Medical Director Philadelphia General Hospital; Instructor in the School of Medicine, University of Pennsylvania; Assistant Professor, Graduate School of Medicine, University of Pennsylvania. Philadelphia General Hospital.

*1897. Dorland, W. A. Newman, A.M., M.D., Professor of Gynecology in the Post-graduate Medical School of Chicago; Professor of Obstetrics in the Chicago College of Medicine and Surgery; Visiting Obstetrician to Cook County Hospital; 7 West Madison St., Chicago, Ill.

1907. Dorrance, George Morris, M.D., Surgeon to St. Agnes' Hospital; Demonstrator of Applied Anatomy in the Dental Department of the University of Pennsylvania. 2025 Walnut St.

1902. Downs, Robert N., Jr., M.D., Surgeon to the Dispensary of the Germantown Hospital. 6008 Greene St., Germantown.

ELECTED

1910. Drayton, William, Jr., M.D., Physician to the Philadelphia Hospital for Contagious Diseases; Physician to the Out-patient Department of the Pennsylvania Hospital; Physician to the Pennsylvania Institute for the Instruction of the Blind; Assistant Physician to the Philadelphia Orthopædic Hospital and Infirmary for Nervous Diseases. 1316 Locust St.

1881. Dulles, Charles Winslow, M.D., Consulting Surgeon of the Rush Hospital. 4101 Walnut St.

1911. Earnshaw, Henry Culp, M.S., M.D., Attending Physician to the Hospital of the Good Shepherd, Rosemont; Assistant Attending Physician to the Bryn Mawr Hospital; Attending Physician to the Bryn Mawr Children's Hospital; Pennsylvania Railroad Surgeon. Bryn Mawr, Pa.

*1887. Edwards, William A., M.D., Professor of Pediatrics in the Medical Department of the University of California. Fifth and Spring Sts., Los Angeles, Cal.

1911. Eliason, Eldridge E., B.A., M.D., Associate in Surgery in the University of Pennsylvania; Surgeon to the Howard Hospital; Assistant Surgeon to the University of Pennsylvania Hospital, the Philadelphia General Hospital and the American Stomach Hospital. 330 S. Sixteenth St.

1904. Elmer, Walter G., B.S., M.D., Professor of Orthopedic Surgery in the Graduate School of Medicine of the University of Pennsylvania; Orthopedic Surgeon to the Jewish Hospital; Surgeon to the Pennsylvania Training School for Children, Elwyn, Pa. 1801 Pine St.

1896. Ely, Thomas C., A.M., M.D. 2041 Green St.

1901. Erck, Theodore A., M.D. 251 S. Thirteenth St.

1893. Eshner, Augustus A., M.D., Consulting Physician to Mercy Hospital. 1019 Spruce St.

*1905. Evans, Joseph S., Jr., A.B., M.D., Professor of Clinical Medicine in the University of Wisconsin; Consulting Physician, Madison General Hospital. 524 N. Francis St., Madison, Wis.

1905. Evans, William, M.D. 4007 Chestnut St.

1912. Eves, Curtis C., M.D., Aural and Laryngeal Surgeon to the Episcopal Hospital; Assistant in the Out-patient Department for Diseases of the Ear, Throat, and Nose of the Pennsylvania Hospital; Demonstrator of Operative Surgery of the Ear, Nose, and Throat in the Philadelphia Polyclinic. 247 S. Seventeenth St.

ELECTED

1894. Faries, Randolph, M.D. 2007 Walnut St.

*1903. Farr, Clifford B., A.M., M.D., Division of Diagnosis and Research, B. F. Goodrich Co. 88 Casterton Ave., Akron, Ohio.

1893. Farr, William W., M.D., Physician to the Leamy Home. 20 W. Ashmead Place, Chestnut Hill.

1884. Fenton, Thomas H., M.D., Ophthalmic Surgeon to St. Vincent's Home, the Baptist Home and the Widener Home for Crippled Children. 1319 Spruce Street.

1907. Fetterolf, George, A.B., M.D., Sc.D., Laryngologist to the Henry Phipps Institute for Tuberculosis; Laryngologist to the White Haven Sanatorium; Consulting Laryngologist to the Phœnixville Hospital; Demonstrator of Anatomy in the University of Pennsylvania. 2047 Chestnut St.

1907. Fife, Charles A., A.B., M.D., Associate in Pediatrics in the University of Pennsylvania; Pediatrist to the Presbyterian Hospital; Physician to the St. Christopher's Hospital for Children; Assistant Physician to the Philadelphia General Hospital. 2038 Chestnut St.

1884. Fisher, Henry M., M.D. 1027 Pine St.

1910. Fisher, John Monroe, M.D., Associate Professor of Gynecology in the Jefferson Medical College; Gynecologist to the Philadelphia, St. Agnes', and Pottstown Hospitals; Assistant Gynecologist to the Jefferson Medical College Hospital. 222 S. Fifteenth St.

1888. Flick, Lawrence F., M.D. 736 Pine St.

1916. Forst, John R., M.D. 166 W. Coulter St., Germantown.

1908. Foulkrod, Collin, M.D., Obstetrician to the Maternity House of the Presbyterian Hospital; Assistant Demonstrator of Obstetrics in Jefferson Medical College; Gynecologist to the Dispensary of the Presbyterian Hospital. 4005 Chestnut St.

1908. Fox, Herbert, M.D., Director of the William Pepper Laboratory of Clinical Medicine, University of Pennsylvania; Pathologist to the Laboratory of Comparative Pathology of the Zoölogical Society of Philadelphia; Pathologist to the Rush Hospital; Pathologist to the Children's Hospital. 3902 Locust St.

†1885. Fox, Joseph M., M.D. Torresdale, Pa.

1906. Fraley, Frederick, Jr., A.B., M.D. Overbrook, Pa.

1903. Francine, Albert Philip, A.M., M.D., Associate Professor of Medicine Post Graduate School of Medicine, University

ELECTED

of Pennsylvania; Director of State Clinics, Medical Dispensary Building of the Medico-Chirurgical Hospital; Visiting Physician, Department of Tuberculosis, Philadelphia General Hospital. 264 S. Twenty-first St.

1897. Frazier, Charles H., A.B., M.D., Sc.D., Professor of Clinical Surgery in the University of Pennsylvania; Surgeon to the University Hospital. 1724 Spruce St.

1916. Funk, Elmer Hendricks, M.D., Assistant Professor of Medicine in the Jefferson Medical College; Medical Director and Physician-in-Charge of the Department for Diseases of the Chest of Jefferson Hospital; Assistant Physician to the Pennsylvania Hospital; Visiting Physician to the White Haven Sanatorium. 1318 Spruce St.

1910. Furbush, Charles Lincoln, M.D. 4300 Spruce St.

1889. Fussell, M. Howard, M.D., Professor of Applied Therapeutics in the University of Pennsylvania; Physician to the University Hospital, the Episcopal Hospital, St. Timothy's Hospital, and St. Mary's Hospital. 2035 Walnut St.; 421 Lyceum Ave., Roxborough.

1899. Gamble, Robert G., M.D., one of the Attending Physicians to the Bryn Mawr Hospital. Haverford, Pa.

1912. Gaskill, Henry Kennedy, M.D., Assistant Professor of Dermatology in the Jefferson Medical College; Attending Dermatologist to the Philadelphia General Hospital. N. E. Cor. 16th and Spruce Sts.

1917. Gerhard, Arthur Howell, M.D. 726 Richmond St.

1902. Ghriskey, Albert A., M.D. 3936 Walnut St.

1899. Gibbon, John H., M.D., Professor of Surgery in the Jefferson Medical College; Surgeon to the Pennsylvania Hospital and Consulting Surgeon to the Bryn Mawr Hospital. 1608 Spruce St.

1920. Gill, A. Bruce, A.B., M.D., Professor of Orthopedic Surgery, University of Pennsylvania; Surgeon to the Orthopedic Hospital; Orthopedic Surgeon to the Episcopal Hospital; Surgeon to the Widener Memorial Industrial Training School for Crippled Children. The Lenox, 13th and Spruce Sts.

*1913. Ginsburg, Nathaniel, M.D., Surgeon to the Jewish Hospital; Associate in Surgery in the Philadelphia Polyclinic and College for graduates in Medicine; Assistant Surgeon to Mt. Sinai Hospital; Instructor in Anatomy in the Uni-

ELECTED

versity of Pennsylvania. 2587 Woodward Ave., Detroit, Mich.

1897. Girvin, John H., M.D., Gynecologist to the Presbyterian Hospital. 2120 Walnut St.

1920. Githens, Thomas Stotesbury, M.D. Hamilton Court, 39th and Chestnut Sts.

1906. Gittings, J. Claxton, M.D., Professor of Pediatrics, Postgraduate School of Medicine, University of Pennsylvania; Associate in Pediatrics in the University of Pennsylvania, School of Medicine; Visiting Physician to the Children's Hospital of Philadelphia; Chief of Pediatric Department, Polyclinic Hospital. 1828 Pine St.

1905. Given, Ellis E. W., M.D., Surgeon to the Philadelphia Freemasons Memorial Hospital of the Masonic Home, Elizabethtown, Pa.; Surgeon to the Dispensary of the Episcopal Hospital. 2714 Columbia Ave.

1894. Gleason, E. B., S.B., M.D., LL.D., Professor of Otology in the Medico-Chirurgical College. 2033 Chestnut St.

1906. Goepp, R. Max, M.D., Professor of Medicine in the Graduate School of Medicine, University of Pennsylvania. 124 S. Eighteenth St.

1906. Goldberg, Harold G., M.D., Ophthalmic Surgeon to the Episcopal Hospital and to the Kensington Hospital for Women. 1925 Chestnut St.

1908. Goodman, Edward H., M.D., Associate in Medicine in the University of Pennsylvania; Consultant to the Medical Dispensary of the University Hospital; Assistant Physician to the University Hospital; Assistant Physician to the Philadelphia General Hospital. 248 S. Twenty-first St.

1905. Gordon, Alfred, M.D., Neurologist to the Mt. Sinai, the Northwestern General, and the Douglass Memorial Hospitals. 1812 Spruce St.

*†1897. Gould, George M., A.M., M.D. 215 Atlantic Ave., Atlantic City, N. J.

1894. Graham, Edwin E., M.D., Professor of Pediatrics in the Jefferson Medical College; Pediatrist to the Jefferson and the Philadelphia General Hospitals; Physician to the Franklin Reformatory Home. 1713 Spruce St.

1904. Grayson, Charles P., M.D., Professor of Laryngology and Rhinology in the University of Pennsylvania; Physician-in-Charge of the Throat and Nose Department of the

ELECTED

University Hospital; Otolaryngologist to the Philadelphia General Hospital. 262 S. Fifteenth St.

1910. Greenman, Milton J., M.D., Sc.D., Director of the Wistar Institute of Anatomy and Biology. Wistar Institute of Anatomy and Biology, Thirty-sixth St. and Woodland Ave.

1883. Griffith, J. P. Crozer, A.B., M.D., Ph.D., Professor of Pediatrics in the University of Pennsylvania; Corresponding Member of the Société de Pédiatrie de Paris; Physician to the Children's Hospital of Philadelphia. 1810 Spruce St.

1912. Griscom, J. Milton, B.S., M.D., Assistant Surgeon to the Wills Eye Hospital; Chief of Clinic of the Eye Dispensary of the Presbyterian Hospital. 1925 Chestnut St.

1911. Gummey, Frank Bird, M.D., Visiting Physician to the Germantown Hospital and Dispensary; Visiting Physician to the Midnight Mission. 5418 Greene St., Germantown.

*1902. Gwyn, Norman B., M.D., 48 Bloor St., E., Toronto, Canada.

1894. Hamill, Samuel McC., M.D., Professor of Diseases of Children in the Philadelphia Polyclinic and College for Graduates in Medicine; Pediatrist to the Presbyterian Hospital; Pediatrist to St. Vincent's Home. 1822 Spruce St.

1897. Hand, Alfred, Jr., M.D., Visiting Physician to the Children's Hospital, to the Children's Hospital of the Mary J. Drexel Home, and to the Methodist Hospital. 1724 Pine St.

1886. Hansell, Howard F., M.D., Professor of Ophthalmology in the Jefferson Medical College; Ophthalmic Surgeon to the Philadelphia General Hospital and to the Jefferson Medical College Hospital; Emeritus Professor of Diseases of the Eye in the Philadelphia Polyclinic. N. E. Cor. 17th and Walnut Sts.

1889. Hare, Hobart A., M.D., Professor of Therapeutics, Materia Medica, and Diagnosis in the Jefferson Medical College. 1801 Spruce St.

1903. Hart, Charles D., A.M., M.D., Inspector and Secretary of the Eastern State Penitentiary; National Executive Committee and Chairman of the Philadelphia Committee, Boy Scouts of America. Chestnut Hill.

1885. Harte, Richard H., M.D., Adjunct Professor of Surgery in the University of Pennsylvania; Surgeon to the Pennsylvania and the Orthopædic Hospitals; Consulting Surgeon to St. Mary's, St. Timothy's, and the Bryn Mawr Hospitals. 1503 Spruce St.

ELECTED

1888. Hartzell, Milton B., A.M., M.D., LL.D., Professor of Dermatology in the University of Pennsylvania. 3644 Chestnut St.

1907. Hatfield, Charles James, A.B (Princeton), M.D., Executive Director of the Henry Phipps Institute for the Study, Treatment, and Prevention of Tuberculosis; Visiting Physician to the White Haven Sanatorium. Phipps Institute, 7th and Lombard Sts.

1872. Hays, I. Minis, M.D. 266 S. Twenty-first St.

1911. Heed, Charles R., M.D., Ophthalmologist to Girard College; Assistant Ophthalmologist to the Jefferson Medical College Hospital. 1205 Spruce St.

1908. Heineberg, Alfred, P.D., M.D., Associate in Gynecology in the Jefferson Medical College; Assistant Gynecologist to St. Agnes' Hospital. N. E. Cor. 16th and Spruce Sts.

1901. Heisler, John C., M.D., Professor of Anatomy in the Medico-Chirurgical College. 3829 Walnut St.

1903. Henry, J. Norman, M.D., Physician to the Pennsylvania Hospital; Clinical Professor of Medicine in the Woman's Medical College of Pennsylvania; Assistant Physician to the Philadelphia General Hospital. 1906 Spruce St.

1891. Hewson, Addinell, A.B., A.M., M.D., Professor of Anatomy in the Philadelphia Polyclinic and College for Graduates in Medicine; Professor of Anatomy and Histology in the Temple University; Surgeon to St. Timothy's Hospital, Roxborough. 2120 Spruce St.

1909. Higbee, William S., M.D., President of the Pennsylvania State Board of Examiners for Registration of Nurses. 1703 S. Broad St.

1897. Hinkle, William M., M.D., Lecturer on the Anatomy and Physiology of the Vocal Organs in the National School of Elocution and Oratory. 1323 N. Thirteenth St.

*1892. Hinsdale, Guy, A.M., M.D. Hot Springs, Virginia.

*1888. Hirsh, A. Bern, M.D. 71 West 94th St., New York City.

1888. Hirst, Barton Cooke, A.B., M.D., LL.D., Professor of Obstetrics in the University of Pennsylvania; Gynecologist to the Philadelphia General and the Howard Hospitals. 1821 Spruce Street.

1903. Hirst, John Cooke, M.D., Associate in Obstetrics, University of Pennsylvania; Obstetrician to St. Agnes' Hospital; Gynecologist and Obstetrician to the Philadelphia General Hospital; Gynecologist to Mt. Sinai Hospital. 1823 Pine St.

ELECTED

*1908. Hitchens, Arthur Parker, M.D., Assistant Professor of Bacteriology, Protozoölogy and Preventive Medicine, Army Medical School. Washington, D. C.

1905. Hodge, Edward Blanchard, A.B., M.D., Surgeon to the Presbyterian and the Children's Hospitals; Associate Surgeon to the Pennsylvania Hospital; Associate Surgeon to the Widener Memorial Training School. 2019 Spruce St.

1913. Hoffman, Clarence, M.D., 1621 Pine St.

°1885. Holland, James W., A.M., M.D., Sc.D., Emeritus Professor of Medical Chemistry and Toxicology and Dean of the Jefferson Medical College. 2006 Chestnut St.

1906. Holloway, Thomas B., M.D., Professor of Ophthalmology in the Philadelphia Polyclinic and School for Graduates in Medicine; Instructor in Ophthalmology in the University of Pennsylvania; Ophthalmologist to the Orthopædic Hospital and Infirmary for Nervous Diseases; Ophthalmologist to the Pennsylvania Institution for the Instruction of the Blind at Overbrook. 1819 Chestnut St.

1914. Hooker, Richard S., M.D. 2147 N. Howard St.

1919. Hopkins, Arthur H., M.D. 1726 Pine St.

1908. Hoyt, Daniel M., M.D., Assistant Visiting Physician to the Philadelphia General Hospital. The Tracy, 36th and Chestnut Sts.

*1912. Huber, G. Carl, M.D., Professor of Anatomy and Director of the Anatomic Laboratories in the University of Michigan. 1330 Hill St., Ann Arbor, Mich.

1892. Hughes, William E., M.D., Visiting Physician to the Philadelphia General Hospital; Pathologist to the Presbyterian Hospital. 3945 Chestnut St.

1912. Hunter, John W., B.S., M.D. 4715 Chester Ave.

1898. Hutchinson, James P., M.D., Surgeon to the Pennsylvania, the Methodist, the Children's, St. Timothy's, and the Bryn Mawr Hospitals; Adjunct Professor of Surgery in the University of Pennsylvania. 133 S. Twenty-second St.

°1871. Ingham, James V., M.D. 1811 Walnut St.

1917. Jackson, Chevalier, M.D. 1830 S. Rittenhouse Sq.

*1885. Jackson, Edward, A.M., M.D., Sc.D., Professor of Ophthalmology in the University of Colorado; Emeritus Professor of Diseases of the Eye in the Philadelphia Polyclinic. 318 Majestic Building, Denver, Col.

ELECTED

*1906. Jacobs, Francis Brinton, B.S., M.D., Assistant Surgeon to the Chester County Hospital. Whitford, Pa.

1920. Janvier, G. Victor, M.D., Instructor in Obstetrics, University of Pennsylvania; Assistant Obstetrician to the Philadelphia General Hospital and the University of Pennsylvania Hospital; Associate in Gynecology at the American Stomach Hospital. Lansdowne, Pa.

1913. Jefferys, William Hamilton, A.B., A.M., M.D. New Street, Chestnut Hill.

1919. Jenks, Horace H., M.D. 918 Clinton St.

1898. Johnson, Russell H., A.B. (Princeton), M.D., Physician to the Pennsylvania Institution for the Deaf and Dumb. Chestnut Hill, Philadelphia.

1918. Jonas, Leon, M.D. 2253 N. 17th St.

1900. Jones, Charles James, A.M., M.D., LL.D., Ophthalmic Surgeon to St. Joseph's Hospital; Ophthalmic Surgeon to the House of the Good Shepherd, Germantown; Consulting Ophthalmologist to St. Vincent's Home. Los Angeles, Cal.

1913. Jones, John F. X., B.S., A.B., A.M., M.D., Instructor in Surgery in the Jefferson Medical College; Surgeon to St. Joseph's, the Misericordia and St. Agnes Hospitals. 103 S. 21st St.

1900. Jopson, John H., M.D., Professor of Surgery in the Philadelphia Polyclinic; Associate in Surgery in the University of Pennsylvania; Surgeon to the Presbyterian and the Children's Hospitals. 1824 Pine St.

1900. Judson, Charles F., A.B., M.D., Physician to St. Christopher's Hospital for Children, to the Southern Home for Destitute Children and to the Sheltering Arms. 1005 Spruce Street.

1902. Jump, Henry D., M.D., Assistant Physician to Philadelphia General Hospital; Physician to the Misericordia Hospital. 2019 Walnut St.

1886. Jurist, Louis, M.D. 1308 N. Broad St.

1903. Kalteyer, Frederick J., M.D., Demonstrator of Clinical Medicine in the Jefferson Medical College; Chief of the Out-patient Department, Assistant Attending Physician, and Hematologist to the Jefferson Medical College Hospital; Pathologist to Philadelphia Lying-in Charity. 2003 Chestnut St.

ELECTED

*1910. KARSNER, HOWARD T., M.D., Professor of Pathology in the Western Reserve University Medical School. Lakeside Hospital, Cleveland, Ohio.

1920. KEATING, PETER MCCALL, M.D., Chief of Surgical Dispensary, St. Agnes Hospital; Assistant Attending Surgeon, Bryn Mawr Hospital; Assistant, Surgical Out-patient Department, Pennsylvania Hospital; Pathologist, Chester County Hospital. Wawa, Pa.

†1867. KEEN, WILLIAM W., M.D., LL.D., Sc.D. (Hon.) Ph.D. (Hon.), F.R.C.S. (Eng. and Edin.), Emeritus Professor of the Principles of Surgery and of Clinical Surgery in the Jefferson Medical College; Membre Correspondant Etranger de la Société de Chirurgie de Paris; Honorary Member of the Société Belge de Chirurgie and of the Clinical Society of London. 1729 Chestnut St.

1912. KEENE, FLOYD E., M.D., Instructor in Gynecology in the University of Pennsylvania; Assistant Gynecologist to the University Hospital; Gynecologist to the Chestnut Hill Hospital. Medical Arts Bldg.

1913. KELLY, FRANCIS JOSEPH, M.D. 2035 Chestnut St.

*1887. KELLY, HOWARD A., A.B., M.D., LL.D. (Aberdeen, Wash. and Lee, and Univ. of Pa.), Professor of Gynecology in Johns Hopkins University and Gynecologist to the Johns Hopkins Hospital, Baltimore, Md.; Hon. Fellow of the Edinburgh Obstetrical Society, the Royal Academy of Medicine of Ireland, and of the Glasgow Obstetrical and Gynecological Society. 1418 Eutaw Place, Baltimore, Md.

1909. KELLY, JAMES A., A.M., M.D., Visiting Surgeon to St. Mary's and St. Timothy's Hospitals; Associate in Surgery in the Philadelphia Polyclinic and College for Graduates in Medicine; Assistant Visiting Surgeon to St. Joseph's Hospital. 1510 N. Seventeenth St.

1912. KELLY, THOMAS C., A.M., M.D., Assistant Instructor of Medicine in the University of Pennsylvania; Pediatrician to St. Mary's Hospital; Physician to Out-patient Department of Germantown Hospital. 105 School Lane, Germantown.

1898. KEMPTON, AUGUSTUS F., M.D. 2118 Pine St.

1905. KERCHER, DELNO E., M.D. 1534 Pine St.

1920. KLAUDER, JOSEPH VICTOR, M.D., Assistant Professor, Dermatology and Syphilology, Post-graduate School of Medicine, University of Pennsylvania; Research Fellow in Experimental Syphilology, Dermatological Research Institute, Philadelphia. 1922 Spruce St.

ELECTED

1920. Klein, Thomas, M.D. 1717 Pine St.

1913. Klopp, Edward J., M.D., Instructor in Surgery in the Jefferson Medical College; Assistant Surgeon to the Germantown Hospital; Chief Clinical Assistant in the Surgical Department of the Jefferson Hospital; Assistant Surgeon to the Out-patient Department of the Pennsylvania Hospital. 1611 Spruce St.

1895. Kneass, Samuel S., M.D., Associate in the William Pepper Laboratory of Clinical Medicine in the University of Pennsylvania. 1510 Walnut St.

1908. Knipe, Jay C., M.D., Ophthalmologist to the Jewish Hospital; Assistant Ophthalmologist to the Philadelphia General Hospital, and to the Mary J. Drexel Home; Chief of the Eye Clinic at the Jefferson Medical College Hospital; Demonstrator of Osteology and Syndesmology in the Jefferson Medical College. 2035 Chestnut St.

1919. Knipe, Norman Leslie, M.D. 2007 Chestnut St.

1908. Knowles, Frank Crozer, M.D., Instructor in Dermatology in the University of Pennsylvania; Clinical Professor of Dermatology in the Woman's Medical College; Dermatologist to the Presbyterian Hospital; Assistant Dermatologist to the Dispensary of the Pennsylvania Hospital. 2022 Spruce Street.

1914. Kolmer, John A., M.D., Dr. P.H., M.Sc., Professor of Pathology and Bacteriology in the Graduate School of Medicine of the University of Pennsylvania; Head of the Department of Pathology and Bacteriology in the Dermatological Research Laboratories of Philadelphia; Consulting Pathologist to St. Vincent's and Misericordia Hospitals; Consulting Serologist to Memorial and Germantown Hospitals. Cynwyd, Pa.

1904. Krauss, Frederick, M.D., Ophthalmic Surgeon to the Episcopal Hospital; Ophthalmic and Aural Surgeon to St. Christopher's Hospital for Children; Laryngologist to the Abington Hospital; Ear, Nose and Throat Physician to the Children's Seashore House for Invalid Children, Atlantic City, N. J. 1701 Chestnut Street.

1914. Krumbhaar, Edward B., A.B., Ph.D., M.D., Director of Laboratories, Philadelphia General Hospital; Associate Professor of Pathology in the Graduate School of Medicine of the University of Pennsylvania. Box 4310, Chestnut Hill.

ELECTED

1900. KRUSEN, WILMER, M.D., Professor of Gynecology in the Medical Department of Temple University; Chief Gynecologist to the Samaritan and the Garretson Hospitals; Consulting Gynecologist to the Charity and Mercy Hospitals. 127 N. Twentieth St.

*1909. LAIRD, J. PACKARD, M.D. 1102 Boulevard, Miami, Florida.

1904. LANDIS, HENRY R. M., M.D., Director of the Clinical and Sociological Departments of the Henry Phipps Institute of the University of Pennsylvania; Assistant Professor in Medicine in the University of Pennsylvania; Visiting Physician to the White Haven Sanatorium. 11 S. Twenty-first St.

1907. LANGDON, H. MAXWELL, M.D., Instructor in Ophthalmology in the University of Pennsylvania; Assistant Surgeon to the Dispensary for Diseases of the Eye in the University Hospital; Assistant Ophthalmologist to the Orthopædic Hospital; Chief of the Dispensary for Diseases of the Eye of the Presbyterian Hospital. 2014 Chestnut St.

*1887. LEAMAN, HENRY, M.D. Leaman Place, Pa.

1920. LEAVITT, FREDERICK HEADLEY, M.D. 1527 Pine St.

1904. LE BOUTILLIER, THEODORE, M.D., Professor of Pediatrics in the Woman's Medical College of Pennsylvania; Pediatrist to the Woman's College Hospital; Physician to the Philadelphia Hospital for Contagious Diseases. 2008 Walnut St.

1893. LE CONTE, ROBERT G., A.B., M.D., Surgeon to the Pennsylvania Hospital; Consulting Surgeon to the Bryn Mawr and Germantown Hospitals. 2000 Spruce St.

1908. LEE, WALTER ESTELL, M.D., Surgeon to the Germantown and Children's Hospitals; Assistant Surgeon to the Pennsylvania and Bryn Mawr Hospitals; Associate Professor of Surgery, Graduate School of Medicine, University of Pennsylvania; Consulting Surgeon, Henry Phipps Institute and Pennsylvania State Department of Health. 905 Pine St.

1903. LEFFMANN, HENRY, A.M., M.D., D.D.S., Ph.D., Emeritus Professor of General Chemistry and Hygiene in the Woman's Medical College of Pennsylvania; Honorary Professor of Chemistry in the Wagner Free Institute of Science; Special Lecturer on Research, Philadelphia College of Pharmacy and Science. 1839 N. Seventeenth St.

ELECTED

1892. Leidy, Joseph, M.D., Officier d'instruction publique, France; Consulting Physician to the Pennsylvania Training School for Feeble-minded Children. 1319 Locust St.

1920. Leopold, Simon S., M.D. 1428 N. Broad St.

1915. Lewis, Fielding O., M.D., Associate in Laryngology in the Jefferson Medical College Hospital; Operating Clinical Chief of the Laryngological Dispensary and Clinical Assistant of the Otological Dispensary of the Jefferson Medical College Hospital; Laryngologist of the Philadelphia General Hospital. 261 S. Seventeenth St.

1877. Lewis, Morris J., M.D., Attending Physician to the Orthopædic Hospital and Infirmary for Nervous Diseases and Emeritus Physician to the Pennsylvania Hospital. 1316 Locust St

1911. Lewis, Paul A., M.D., Director of the Pathological Department of the Henry Phipps Institute of the University of Pennsylvania; Assistant Professor of Pathology in the University of Pennsylvania. Henry Phipps Institute. Seventh and Lombard Streets.

1904. Lindauer, Eugene, M.D., Instructor of Neurology in the Medico-Chirurgical Hospital; Associate in Clinical Medicine in the Philadelphia Polyclinic; Assistant Neurologist to the Philadelphia General Hospital. 2018 N. Thirty-second Street.

1886. Lloyd, J. Hendrie, A.M. (Princeton), M.D., Neurologist to the Philadelphia General Hospital, and to the Methodist Episcopal Hospital; Consulting Neurologist to the State Asylum for the Chronic Insane at Wernersville, and to the Pennsylvania Training School for Feeble-minded Children at Elwyn. 4057 Spruce St.

1907. Lodholz, Edward, M.D., Demonstrator of Physiology in the University of Pennsylvania. 1106 S. 52d St.

1893. Longaker, Daniel, M.D., Obstetrician to the Kensington Hospital for Women and Visiting Obstetrician to the Jewish Maternity Hospital. 1402 N. Sixteenth St.

1907. Loux, Hiram R., M.D., Professor of Genito-urinary Surgery in the Jefferson Medical College; Surgeon to the Philadelphia General Hospital. Medical Arts Building, Sixteenth and Walnut Sts.

1919. Lynch, Frank B., Jr., M.D., Pepper Laboratory, University of Pennsylvania.

1914. Lyon, B. B. Vincent, A.B. (Williams Coll.), M.D. 2014 Walnut St.

ELECTED

1900. McCarthy, Daniel J., M.D., Professor of Medical Jurisprudence (George B. Wood Foundation) in the University of Pennsylvania; Neurologist to the Philadelphia General and St. Agnes' Hospitals, and to the Henry Phipps Institute. 2025 Walnut St.

*1903. McConnell, Guthrie, M.D., Pathologist to the Cleveland City Hospital; Associate in Pathology, Western Reserve Medical School. 2601 Hampshire Road, Cleveland, Ohio.

1913. McCrae, Thomas, B.A., M.D., F.R.C.P. (Lond.), Professor of Medicine in the Jefferson Medical College; Physician to the Jefferson and Pennsylvania Hospitals. 1627 Spruce Street.

1895. McFarland, Joseph, M.D., Sc.D., Professor of Pathology and Bacteriology in the Medical Department of the University of Pennsylvania; Pathologist to the Philadelphia General Hospital. 442 W. Stafford St., Germantown.

1913. McGlinn, John A., B.A., M.D., Associate Professor of Gynecology, Graduate School of Medicine, University of Pennsylvania; Gynecologist to St. Agnes' Hospital; Gynecologist and Obstetrician, Philadelphia General Hospital; Gynecologist to Phipps Institute and Eaglesville Sanitarium. 113 S. Twentieth St.

1905. McKenzie, Robert Tait, A.B., M.D., Professor of Physical Education and Director of the Department of Physical Education in the University of Pennsylvania. 2014 Pine St.

1916. McKnight, Howard A., A.B., M.D., Instructor in Surgery, Graduate School of Medicine, University of Pennsylvania; Assistant Surgeon, St. Mary's Hospital, Out-patient Department Surgery, Polyclinic, St. Mary's and Medico-Chirurgical Hospitals. 241 S. Thirteenth St.

1915. McLean, John D., M.D. 1538 S. Broad St.

*1900. McReynolds, Robert Phillips, M.D. 213 S. Broadway, Los Angeles, Cal.

1886. MacCoy, Alexander W., M.D., Consulting Laryngologist to the Bryn Mawr Hospital. 1503 Locust St.

1910. Mackinney, William H., M.D., Assistant Surgeon to the Dispensary for Genito-urinary Diseases, University Hospital; Assistant in the Urological Dispensary of the Lankenau Hospital. 1701 Chestnut St.

1914. Maier, F. Hurst, M.D., Associate in Gynecology to the Jefferson Medical College; Gynecologist to St. Joseph's Hospital. 2035 Chestnut St.

ELECTED

1913. Major, C. Percy, M.D., Physician to the Dispensary of the Germantown Hospital; Pediatrist to the Dispensary of the Germantown Hospital; Pediatrist to the Abington Memorial Hospital. Tenth and Oak Lane.

1913. Manges, Willis F., M.D., Roentgenologist to the Jefferson Hospital; Director of the Roentgen Ray Laboratory in the Philadelphia General Hospital. 235 S. Fifteenth St.

1898. Marshall, George Morley, M.D., Laryngologist to the Philadelphia General Hospital; Laryngologist and Otologist to St. Joseph's Hospital. 1819 Spruce St.

1889. Martin, Edward, M.D., John Rhea Barton Professor of Surgery in the University of Pennsylvania; Surgeon to the University, Howard, Philadelphia General, and Bryn Mawr Hospitals. 135 S. Eighteenth St.

*1911. Meigs, Edward Browning, A.B., M.D., Physiologist in the Dairy Division of the United States Department of Agriculture. 1445 Rhode Island Ave., N. W., Washington, D. C.

1914. Mencke, J. Bernhard, A.B., M.D., Assistant Surgeon to the Out-patient Department of the Lankenau Hospital; Assistant Surgeon to the Stetson Hospital. 1816 Spruce Street.

1914. Merrill, Wm. Jackson, A.B., M.D., Instructor in Orthopædic Surgery, University of Pennsylvania; Assistant Orthopædic Surgeon, University Hospital; Orthopædic Surgeon to the Children's Hospital, Children's Seashore House and Howard Hospital; Consulting Orthopædic Surgeon to the Germantown Hospital. Medical Arts Building, Sixteenth and Walnut Sts.

*1894. Miller, D. J. Milton, M.D., Associate Physician to the Children's Hospital, Philadelphia; Pediatrist to the Bamberger Home for Invalid Children, Longport, N. J. N. W. Cor. Pacific and California Aves., Atlantic City, N. J.

1910. Miller, Morris Booth, M.D., Professor of Surgery in the Philadelphia Polyclinic; Surgeon to the Douglass Memorial Hospital; Assistant Surgeon to the Philadelphia General Hospital. 409 S. Twenty-second St.

1881. Mills, Charles K., M.D., LL.D., Emeritus Professor of Neurology in University of Pennsylvania; Neurologist to Philadelphia General Hospital; Consulting Physician to the Orthopædic Hospital and Infirmary for Nervous Diseases. 1909 Chestnut Street.

ELECTED

1917. Mitchell, A. Graeme, M.D., Instructor in Pediatrics, University of Pennsylvania; Instructor in Pediatrics, Postgraduate School, University of Pennsylvania; Clinical Assistant, Children's Hospital of Philadelphia; Physician to Dispensary Children's Hospital of Philadelphia. 1717 Pine St.

1904. Mitchell, Charles F., M.D., Surgeon to the Pennsylvania, Bryn Mawr, and Germantown Hospitals. 332 S. Fifteenth Street.

1908. Montgomery, Charles M., A.B., M.D., Instructor in the Henry Phipps Institute (University of Pennsylvania); Physician to the Dispensaries of the Pennsylvania and St. Agnes' Hospitals. 1815 De Lancey St.

1882. Montgomery, Edward E., A.M., M.D., LL.D., Professor of Gynecology in the Jefferson Medical College; Gynecologist to the Jefferson Medical College Hospital and to St. Joseph's Hospital. 1426 Spruce St.

1918. Morgan, Arthur C., M.D., Associate in Medicine in the Undergraduate Medical Department, University of Pennsylvania; Associate Professor in Medicine in the Medico-Chirurgical College, Graduate School of Medicine, University of Pennsylvania; Attending Physician, Philadelphia General Hospital; Physician-in-Chief to the Frankford Hospital. 3118 Diamond St.

1886. Morris, Caspar, M.D. 2050 Locust St.

1893. Morris, Elliston J., M.D., Physician to the Episcopal Hospital. 128 S. Eighteenth St.

1883. Morris, Henry, M.D., Professor of Anatomy in the Woman's Medical College of Pennsylvania; Senior Visiting Physician to St. Joseph's Hospital. 313 S. Sixteenth St.

°1856. Morris, J. Cheston, M.D. "Fernbank," West Chester, Pa.

1906. Morrison, William H., M.D. 8021 Frankford Ave.

1897. Morton, Samuel W., M.D. 1926 Chestnut St.

1905. Müller, George P., M.D., Professor of Surgery in the Graduate School of the University of Pennsylvania; Associate in Surgery in the Medical School of the University of Pennsylvania; Surgeon to the Misericordia and St. Agnes' Hospitals; Consulting Surgeon to the Chester County Hospital. 1930 Spruce St.

1915. Musser, John H., Jr., B.S., M.D., Assistant Professor in Medicine in the University of Pennsylvania; Physician to the Philadelphia General Hospital; Physician-in-Charge, Medical Dispensary, University Hospital; Dispensary Chief

ELECTED

and Assistant in the Presbyterian Hospital. 262 S. Twenty-first St.

1905. Mutschler, Louis H., M.D., Surgeon to the Episcopal Hospital; Assistant Surgeon to the Orthopædic Hospital. 1625 Spruce St.

*1896. Myers, T. D., M.D. P. O. Box 314, Pasadena, Cal.

1902. Nassau, Charles F., M.D., LL.D., Assistant Professor of Surgery in the Jefferson Medical College; Surgeon to St. Joseph's Hospital; Chief Surgeon to the Frankford Hospital; Surgeon to Mount Sinai Hospital. 1710 Locust St.

1886. Neff, Joseph S., A.M., M.D., LL.D., 106 S. Twenty-first St.

1887. Neilson, Thomas Rundle, A.M., M.D., Surgeon to the Episcopal Hospital and to St. Christopher's Hospital for Children; Professor of Genito-urinary Surgery in the University of Pennsylvania. 1937 Chestnut St.

1905. Newcomet, William S., M.D. 3501 Baring St.

1905. Newlin, Arthur, B.S., M.D., Physician to the Pennsylvania Hospital; Physician to the Dispensary of the Children's Hospital; Assistant Physician to the Orthopædic Hospital. 1804 Pine St.

1899. Nicholson, William Rufus, A.B., M.D., Gynecologist to the Polyclinic and Methodist Episcopal Hospitals; Obstetrician to the Presbyterian Hospital; Associate in Obstetrics in the University of Pennsylvania. 2023 Spruce St.

1889. Noble, Charles P., M.D. 1832 Spruce St.

1905. Norris, Charles C., M.D., Associate in Gynecology, University of Pennsylvania Medical School; Assistant Professor, Post-graduate School of Medicine, University of Pennsylvania; Assistant Gynecologist to the Hospital of the University of Pennsylvania; Gynecologist to the Children's Hospital, Philadelphia. Coronado, 22d and Chestnut Sts.

1905. Norris, George William, A.B., M.D., Assistant Professor of Medicine in the University of Pennsylvania; Physician to the Pennsylvania Hospital; Assistant Physician to the University Hospital. 1820 S. Rittenhouse Sq.

*1901. Norris, Henry, M.D., Surgeon to the Rutherford Hospital. Rutherfordton, N. C.

1892. Norris, Richard C., M.D., Lecturer on Clinical and Operative Obstetrics in the University of Pennsylvania; Obstetrician in Charge of the Preston Retreat; Visiting Obstetrician

ELECTED

to the Philadelphia General Hospital; Gynecologist to the Methodist Episcopal Hospital, and Consulting Obstetrician and Attending Gynecologist to the Southeastern Dispensary and Hospital. 500 N. Twentieth St.

1913. O'Neal, Alexander H., A.B., A.M., M.D., Physician to the Cathcart and Richardson Homes, Devon; Anesthetizer to the Bryn Mawr Hospital. St. Davids, Pa.

1920. Ostheimer, Alfred J., A.B., M.D., L.R.C.P. (London), M.R.C.S. (England), Examiner of Mental Diseases, Philadelphia General Hospital; Chief, Neuro-psychiatric Section, District No. 3, United States Public Health Service. Jenkintown, Pa.

1903. Ostheimer, Maurice, A.B., M.D., Associate in Pediatrics in the University of Pennsylvania; Visiting Physician to the Philadelphia Hospital for Contagious Diseases; Physician-in-Charge of the Children's Dispensary and Assistant Visiting Pediatric Physician, University Hospital; Physician to the Medical Dispensary of the Children's Hospital. 2204 De Lancey Place.

1913. Outerbridge, George W., A.B., M.D., Associate Professor of Gynecology, Graduate School of Medicine of the University of Pennsylvania; Assistant Gynecologist to the Methodist Hospital; Gynecologist to the Abington Memorial Hospital. 2039 Chestnut St.

1915. Owen, Hubley R., M.D., Surgeon to the Philadelphia General Hospital; Assistant Surgeon to the Orthopædic Hospital; Chief Surgeon of the Bureaus of Police and Fire, Philadelphia. 319 S. Sixteenth St.

1897. Packard, Francis R., M.D., Surgeon to the Out-patient Department for Diseases of the Ear, Throat, and Nose of the Pennsylvania Hospital; Laryngologist to the Children's Hospital of Philadelphia; Consulting Aurist to the Bryn Mawr Hospital. 304 S. Nineteenth St.

1898. Page, Henry F., M.D., Assistant Physician to the Lankenau Hospital and Physician to the Medical Dispensary of the same; Clinical Professor of Medicine in the Woman's Medical College of Pennsylvania. 315 S. Sixteenth St.

1906. Pancoast, Henry K., M.D., Professor of Röntgenology in the University of Pennsylvania and Röntgenologist to the University Hospital. Ardmore, Pa.

ELECTED

1909. Parish, Benjamin D., B.S., M.D., Assistant Instructor in Otology in the University of Pennsylvania; Assistant Surgeon to the Dispensary for Diseases of the Ear, University Hospital; Aurist and Laryngologist to St. Agnes' Hospital. 7318 Bryan St., Mt. Airy, Philadelphia.

1899. Parke, William E., M.D., Consulting Obstetrician to the Episcopal Hospital; Associate Surgeon to the Kensington Hospital for Women; Gynecologist to the Frankford Hospital. 1739 N. Seventeenth St.

1910. Patterson, Ross Vernet, M.D., Dean, Jefferson Medical College; Associate Professor of Medicine in the Jefferson Medical College; Physician to the Philadelphia Hospital; Assistant Physician to the Jefferson Hospital. 2126 Spruce Street.

1903. Pearce, Richard M., M.D., Sc.D., Professor of Research Medicine in the University of Pennsylvania. 2114 De Lancey Place.

1909. Pemberton, Ralph, M.S., M.D., Visiting Physician to the Presbyterian Hospital; Director of the Department of Clinical Chemistry in the Pathological Laboratory of the Presbyterian Hospital. 318 S. Twenty-first St.

†1889. Penrose, Charles Bingham, M.D., Ph.D. (Harvard), Formerly Professor of Gynecology in the University of Pennsylvania. 1720 Spruce St.

1914. Pepper, O. H. Perry, B.S., M.D., Assistant Professor of Medicine, University of Pennsylvania. Medical Arts Bldg.

†1902. Pepper, William, A.B., M.D., Dean of the School of Medicine, University of Pennsylvania; President Association of American Medical Colleges. 1813 Spruce St.

1916. Percival, Milton Fraser, M.D. 2332 S. Broad St.

1917. Peter, Luther C., A.M., M.D., Professor of Diseases of the Eye, Temple Medical School; Professor of Ophthalmology, University of Pennsylvania Graduate School. 1529 Spruce St.

1912. Petty, Orlando H., B.S., A.M., M.D., Instructor in Medicine in the Jefferson Medical College; Pathologist and Assistant Physician to St. Timothy's Hospital; Physician to the Kensington Dispensary for the Treatment of Tuberculosis. 6215 Ridge Ave.

1905. Pfahler, George E., M.D., Professor of Roentgenology in the Medico-Chirurgical Post-Graduate School of Medicine

ELECTED

of the University of Pennsylvania; Director of the *X*-ray Laboratories at the Howard Hospital, Polyclinic Hospital and the Misericordia Hospital. 1321 Spruce St.

1915. Pfeiffer, Damon B., A.B., M.D., Instructor in Surgery, University of Pennsylvania; Assistant Surgeon, University Hospital; Pathologist to the Lankenau Hospital; Director of the Clinical Laboratory, Presbyterian Hospital. 2028 Pine Street.

1907. Pfromm, George W., Ph.G., M.D., Assistant Physician to the American Stomach Hospital; Consulting Physician to the German Protestant Home for the Aged. 1431 N. Fifteenth St.

1907. Phillips, Horace, M.D., Second Assistant Physician to the Pennsylvania Hospital for the Insane; Visiting Physician to the Eastern Penitentiary of Pennsylvania. 905 Land Title Building.

1883. Piersol, George A., M.D., Sc.D., Professor of Anatomy in the University of Pennsylvania. 4724 Chester Ave.

1911. Piersol, George Morris, B.S., M.D., Professor of Medicine in the Graduate School of Medicine of the University of Pennsylvania; Professor of Medicine in the Woman's Medical College of Pennsylvania; Physician to the Philadelphia General Hospital. 1913 Spruce St.

1917. Piper, Edmund Brown, B.S., M.D., Associate in Obstetrics, University of Pennsylvania Medical School; Assistant Professor in Obstetrics, University of Pennsylvania Post-graduate School; Assistant Obstetrician to the University Hospital; Assistant Obstetrician and Gynecologist to the Philadelphia General Hospital. 1936 Spruce St.

1905. Pitfield, Robert L., M.D., Pathologist to the Germantown Hospital; Bacteriologist to the Chestnut Hill Hospital for Lung Diseases. 5211 Wayne Ave.

1896. Posey, William Campbell, M.D., Ophthalmic Surgeon to the Howard Hospital; Consulting Ophthalmic Surgeon to the Wills Eye Hospital; Chairman of the Commission on the Conservation of Vision for Pennsylvania. 2049 Chestnut Street.

1899. Potts, Charles S., M.D., Professor of Neurology, Graduate School, University of Pennsylvania; Neurologist to the Philadelphia General Hospital; Consulting Neurologist,

ELECTED

Lankenau Hospital; Consulting Neurologist, Hospital for the Insane, Atlantic County, New Jersey, 2018 Chestnut St.

*1907. Price, George E., M.D. Suite 620, Paulsen Bldg., Spokane, Wash.

†1903. Pyle, Walter L., A.M., M.D., Assistant Surgeon to the Wills Eye Hospital. 1931 Chestnut St.

1920. Quicksall, William E., M.D. 1819 Spruce St.

1908. Radcliffe, McCluney, A.M. (Lafayette), M.D., LL.D., Ophthalmic Surgeon to the Presbyterian Hospital; Attending Surgeon to the Wills Eye Hospital. 1906 Chestnut St.

1913. Randall, Alexander, A.M., M.D., Assistant Instructor in Surgery in the University of Pennsylvania; Assistant Surgeon in the Genito-Urinary Dispensary of the University of Pennsylvania. 1310 Medical Arts Building.

1887. Randall, B. Alexander, M.A., M.D., Professor of Otology in the University of Pennsylvania; Ear Surgeon to the Children's Hospital; Consulting Aurist to the Pennsylvania Institution for the Deaf and Dumb, and to St. Timothy's Hospital. 1717 Locust St.

*1904. Ravenel, Mazyck P., M.D., Professor of Preventive Medicine and Bacteriology and Director of the Public Health Laboratory at the University of Missouri. 203 Hicks Ave., Columbia, Mo.

1920. Rehfuss, Martin E., M.D. N. E. Cor. 16th and Spruce Sts.

1919. Reiman, Stanley P., M.D. 516 Arbutus St., Gtn.

1897. Rhein, John H. W., M.D., Professor of Neurology in the Graduate School of Medicine, University of Pennsylvania; Neurologist to the Howard Hospital; Visiting Physician to the Psychopathic Wards of the Philadelphia General Hospital; Consulting Neurologist to the Philadelphia Home for Incurables. 1732 Pine St.

1906. Rhein, Robert D., M.D., Chief Physician to the Clinic of the American Hospital for Diseases of the Stomach; Physician to the Philadelphia Home for Incurables; Examining Physician to the White Haven Sanatorium. S. W. Cor. 15th and Pine Sts.

1891. Rhoads, Edward G., M.D. 159 W. Coulter St., Germantown.

*1910. Rhoads, Samuel, M.D. Pasadena, California.

1919. Richardson, Russell, M.D. 320 S. Sixteenth St.

1919. Ridpath, Robert F., M.D. 1928 Chestnut St.

ELECTED

1898. Riesman, David, M.D., Professor of Clinical Medicine in the University of Pennsylvania; Visiting Physician to the Philadelphia General Hospital; Consulting Physician to the Jewish Hospital. 1715 Spruce Street.

1895. Ring, G. Oram, A.M., M.D., Orphthalmic Surgeon to the Episcopal Hospital; Ophthalmologist to the Widener Memorial Home for Crippled Children; Consulting Ophthalmologist to the American Oncologic Hospital. N. E. Cor. Seventeenth and Walnut Sts.

*1905. Risley, J. Norman, M.D. New Bedford, Mass.

†1878. Roberts, John B., A.M., M.D., Professor of Surgery in the University of Pennsylvania Graduate School of Medicine. 313 S. Seventeenth St.

1899. Roberts, Walter, M.D., Professor of Otology in the Philadelphia Polyclinic; Otologist to the Methodist Episcopal Hospital; Laryngologist to the Philadelphia General Hospital. 1732 Spruce St.

1903. Robertson, William Egbert, M.D., Professor of Theory and Practice of Medicine and of Clinical Medicine in Temple University; Physician to the Episcopal, Samaritan, and Garretson Hospitals. 327 S. Seventeenth St.

1902. Robinson, James Weir, M.D., Assistant Surgeon to the Presbyterian Hospital. 326 S. Sixteenth St.

1903. Robinson, William Duffield, Ph.G., M.D. 2012 Mount Vernon St.

1912. Rodman, John Stewart, M.D., Lecturer on Surgery in the Medico-Chirurgical College; Assistant Surgeon to the Medico-Chirurgical Hospital; Surgeon to the Dispensary of the Presbyterian Hospital; Assistant Surgeon to the Out-patient Department of the Pennsylvania Hospital. 1310 Medical Arts Building.

1909. Rosenberger, Randle C., M.D., Professor of Hygiene and Bacteriology in the Jefferson Medical College. 2330 N. Thirteenth St.

1898. Ross, George G., M.D., Visiting Surgeon, Germantown, Stetson and Methodist Hospitals; Assistant Surgeon, Lankenau Hospital; Assistant Surgeon, Hospital of the University of Pennsylvania; Associate in Surgery, University of Pennsylvania School of Medicine. 1721 Spruce St.

*1907. Royer, B. Franklin, M.D., Mass.-Halifax Health Commission. Halifax, Nova Scotia.

ELECTED

†1905. Rugh, James Torrance, A.B., M.D., Clinical Professor of Orthopedic Surgery in the Woman's Medical College of Pennsylvania; Orthopedic Surgeon to the Jefferson Medical College; Orthopedic Surgeon to the Methodist and the Philadelphia General Hospitals. 1616 Spruce St.

1897. Sailer, Joseph, Ph.B., M.D., Professor of Clinical Medicine in University of Pennsylvania; Physician to the Philadelphia General, the University, and Presbyterian Hospitals. 1718 Spruce St.

1900. Sajous, Charles E. de M., M.D., LL.D., ScD., Knight of the Legion of Honor of France; and of the Order of Leopold of Belgium; Professor of Therapeutics in Temple University Medical School. 2043 Walnut St.

1905. Sartain, Paul J., A.M., M.D. 2006 Walnut St.

1908. Sautter, Albert C., M.D., Assistant in the Dispensary for Diseases of the Eye in the University Hospital; Assistant in the Eye Dispensary of the Lankenau Hospital, 1421 Locust St.

1906. Saylor, Edwin S., M.D., Chief Ophthalmic Surgeon to the Charity Hospital of Philadelphia, and to the Department Eye and Ear, American Hospital for Diseases of the Stomach. 2005 Chestnut St.

1920. Scarlett, Hunter W., M.D. 2228 Locust St.

*1910. Scarlett, Rufus B., M.D., Laryngologist to the Home for Consumptives at Chestnut Hill; Assistant in the Department for Diseases of the Ear, Throat, and Nose of the Pennsylvania Hospital; Instructor in Diseases of the Nose and Throat in the Philadelphia Polyclinic and College for Graduates in Medicine. 78 N. Clinton Ave., Trenton, N. J.

1917. Schaeffer, Jacob Parsons, A.M., M.D., Ph.D., Professor of General Anatomy and Director of the Daniel Baugh Institute of Anatomy of the Jefferson Medical College. 4634 Spruce St.

1899. Schamberg, Jay F., M.D., Professor of Dermatology and Syphilology, Jefferson Medical College; Professor of Dermatology and Infectious Eruptive Diseases, Graduate School, University of Pennsylvania. 1922 Spruce St.

1917. Schnabel, Truman Gross, A.B. (Lehigh), M.D., Instructor in Medicine, University of Pennsylvania; Assistant Physician Philadelphia General Hospital; Physician in the Medical

ELECTED

Out-patient Department, University Hospital. 1704 Pine Street.

1917. Schoff, Charles H., M.D. Media, Pa.

1887. de Schweinitz, George Edmund, A.M., M.D., LL.D., Professor of Ophthalmology in the University of Pennsylvania; Consulting Ophthalmic Surgeon to the Orthopædic Hospital and Infirmary for Nervous Diseases; The Philadelphia Polyclinic and School for Graduates in Medicine, and the Philadelphia General Hospital; Ophthalmic Surgeon to the University Hospital. 1705 Walnut St.

*1913. de Schweinitz, George Lord, B.S., M.D., Assistant in the Department of Ophthalmology, St. Luke's Hospital, Bethlehem, Pa. 85 East Broad St., Bethlehem, Pa.

1910. Schwenk, Peter N. K., M.A., M.D., Attending Surgeon to the Eye Department of the Pennsylvania Hospital; Attending Surgeon to the Wills Eye Hospital. 1417 N. Broad Street.

1892. Seiss, Ralph W., M.D., Professor of Otology in the Philadelphia Polyclinic; Consulting Laryngologist to the Pennsylvania Institution for the Deaf and Dumb. 255 S. Seventeenth St.

1917. Service, Charles A., M.D. Bala, Pa.

1908. Shannon, Charles E. G., A.B., M.D., Instructor in Ophthalmology in the Jefferson Medical College; Assistant in the Ophthalmological Clinic at the Jefferson Medical College Hospital; Ophthalmologist to the Seybert Institution. 1633 Spruce St.

1897. Sharpless, William T., M.D., Physician to the Chester County Hospital. West Chester, Pa.

1906. Shields, William G., M.D., Dermatologist to Germantown Hospital; Chief of Dermatological Clinic and Assistant Physician to the Jewish Hospital. 414 School Lane, Germantown.

1890. Shoemaker, George Erety, A.M., M.D., Gynecologist to the Presbyterian Hospital and to the Pennsylvania Epileptic Hospital and Colony Farm. 1906 Chestnut St.

*1908. Shoemaker, Harlan, A.B., M.D., Lecturer in Surgery, University of Southern California; Surgeon to Los Angeles County Hospital, Surgeon to Washington Street Clinic. 621 March Strong Building, Los Angeles, Cal.

†1893. Shoemaker, Harvey, M.D., Visiting Physician to the Sheltering Arms; Consulting Physician to the Southern Home

ELECTED

for Destitute Children; Assistant Physician to the Lankenau Hospital; Physician to the Out-patient Department of the Lankenau Hospital. N. W. Cor. 20th and Chestnut Sts.

†1896. Shoemaker, William T., M.D., Professor of Ophthalmology, Graduate School of Medicine, University of Pennsylvania; Clinical Professor of Ophthalmology in the Woman's Medical College of Pennsylvania; Ophthalmologist to Lankenau, Germantown and Pennsylvania Hospitals. 109 S. Twentieth St.

1900. Shumway, Edward Adams, B.S., M.D., Ophthalmic Surgeon to the Philadelphia General Hospital; Ophthalmic Surgeon to the Children's Hospital; Instructor in Ophthalmology in the University of Pennsylvania, and Assistant Ophthalmic Surgeon to the University Hospital; Ophthalmic Surgeon to the Lankenau Hospital. 2046 Chestnut St.

1903. Sinclair, John Falconer, M.D., Physician to the Medical Dispensary of the Presbyterian Hospital; Physician to the Philadelphia Orphan Asylum and to the Presbyterian Orphanage; Physician to the Home of the Merciful Saviour for Crippled Children. 4103 Walnut St.

1907. Sinkler, Francis Wharton, A.B., M.D., Physician to the Orthopædic Hospital and Infirmary for Nervous Diseases; Physician to the Episcopal Hospital. 1606 Walnut St.

1902. Siter, E. Hollingsworth, M.D., Instructor in Genito-urinary Diseases in the University of Pennsylvania; Genito-urinary Surgeon to the Philadelphia General Hospital; Surgeon-in-Charge of the Genito-urinary Dispensary of the University Hospital; Consulting Genito-urinary Surgeon to the Eastern Penitentiary, and to the Philadelphia County Prison. 1520 Locust St.

1904. Skillern, Penn-Gaskell, M.D. 241 S. Thirteenth St.

1920. Skillern, Ross Hall, M.D., Professor of Laryngology, Post-graduate School, University of Pennsylvania; Laryngologist to Medico-Chirurgical Hospital. 1928 Chestnut St.

1904. Smith, Allen J., A.M., M.D., Sc.D. (Penna. Coll.), LL.D. (McGill Univ.), Professor of Pathology and of Comparative Pathology, and Director of Courses in Tropical Medicine in the University of Pennsylvania. Medical Laboratories, University of Pennsylvania.

1905. Smith, S. MacCuen, M.D., Professor of Otology in the Jefferson Medical College; Aurist and Laryngologist to the

ELECTED

Germantown Hospital; Aurist to the Jewish Hospital; Consulting Aurist to the Oncologic Hospital. 1429 Spruce St.

1919. Smyth, Henry Field, M.D. Wayne, Pa.

1908. Speese, John, M.D., Associate Professor in Surgery, Graduate School University of Pennsylvania; Instructor in Surgery in the University of Pennsylvania; Surgeon to the Children's Hospital; Assistant Surgeon to the Presbyterian Hospital. 2032 Locust St.

1895. Spellissy, Joseph M., A.M., M.D., Visiting Surgeon to St. Joseph's and to the Methodist Episcopal Hospitals; Assistant Surgeon to the Orthopedic Department of the University Hospital. 317 S. Fifteenth St.

1897. Spiller, William G., M.D., Professor of Neurology in the University of Pennsylvania; Clinical Professor of Nervous Diseases in the Woman's Medical College of Pennsylvania; Neurologist to the Philadelphia General Hospital; Consultant Neurologist to the Pennsylvania Hospital. 4409 Pine St.

1894. Stahl, B. Franklin, B.S., Ph.G., M.D., Clinical Professor of Medicine in the Woman's Medical College of Pennsylvania; Associate in Medicine and Lecturer on Dietetics of the Sick in the University of Pennsylvania; Visiting Physician to St. Agnes' and the Philadelphia General Hospitals. 1727 Pine St.

1909. Starbuck, J. Clinton, M.D., Physician to the Orphanage, Orphan Society of Philadelphia at Wallingford and to the Glen Mills School, Glen Mills, Pa. 42 E. Washington St., Media, Pa.

*1875. Starr, Louis, M.D., LL.D. (Haverford). Care of Brown, Shipley & Co., London, England.

1912. Stauffer, Nathan Pennypacker, D.D.S., M.D., Laryngologist and Otologist to the Dispensary of the Presbyterian Hospital; to the Pennsylvania Hospital; to the Philadelphia General Hospital, Tubercular Department; to the Home for Crippled Children. 1819 Walnut St.

1910. Stellwagen, Thomas C., Jr., M.D., Chief Clinical Assistant in the Out-patient Surgical Department of the Jefferson Medical College Hospital. 1912 Pine St.

1895. Stengel, Alfred, M.D., Sc.D., Professor of Medicine in the University of Pennsylvania; Physician to the University Hospital and the Pennsylvania Hospital. 1728 Spruce Street.

ELECTED

1901. Stevens, Arthur A., M.D., Professor of Materia Medica, Therapeutics, and Clinical Medicine in the Woman's Medical College of Pennsylvania; Lecturer on Physical Diagnosis in the University of Pennsylvania; Physician to the Episcopal and St. Agnes' Hospitals. 314 S. Sixteenth Street.

1914. Stewart, Thomas S., B.S. (Univ. of Penna.), M.D. 301 S. Eighteenth St.

1898. Stout, George C., M.D., Professor of Otology in the Philadelphia Polyclinic and College for Graduates in Medicine; Laryngologist and Aurist to the Presbyterian Hospital, the Children's Aid Society, and the William Penn Charter School. 1611 Walnut St.

1884. Stryker, Samuel S., M.D., Physician to the Presbyterian Hospital. 3833 Walnut St.

*1900. Swan, John M., M.D. 457 Park Avenue, Rochester, New York.

1898. Sweet, William M., M.D., Clinical Professor of Ophthalmology in the Jefferson Medical College, and Ophthalmic Surgeon to the Jefferson Medical College Hospital; Professor of Diseases of the Eye in the Philadelphia Polyclinic; Attending Surgeon to the Wills Eye Hospital. 1205 Spruce St.

1900. Talley, James Ely, A.B., M.D., Clinical Professor of Cardiac Diseases, Graduate School, University of Pennsylvania; Visiting Physician to the Presbyterian and Methodist Episcopal Hospitals; Consulting Physician to the Eastern Penitentiary. 218 S. Twentieth St.

1911. Taylor, Alonzo Englebert, M.D., Rush Professor of Physiological Chemistry in the University of Pennsylvania. 4522 Locust St.

1886. Taylor, John Madison, A.B. and A.M. (Princeton), M.D., Professor of Physical Therapeutics and Diatetics, Medical Department Temple University. 1504 Pine St.

1887. Taylor, William J., M.D., Surgeon to the Orthopædic Hospital and Infirmary for Nervous Diseases, and to St. Agnes' Hospital; Consulting Surgeon to the West Philadelphia Hospital for Women. 1825 Pine St.

1886. Taylor, William L., M.D. 1340 N. Twelfth St.

ELECTED

†1910. Thomas, Benjamin A., A.B., A.M., M.D., Professor of Genito-urinary Surgery in the Philadelphia Polyclinic and College for Graduates in Medicine; Head of the Department of Genito-urinary Surgery, Presbyterian Hospital; Instructor in Surgery in the University of Pennsylvania; Surgeon-in-Chief to the Out-patient Department of the University Hospital. 116 S. Nineteenth St.

1867. Thomas, Charles Hermon, M.D. 3634 Chestnut St.

1912. Thomas, Frank Wister, A.M., M.D., Visiting Physician to "Buttercup Cottage;" Consulting Physician to the Germantown Hospital. 27 E. Mt. AiryAve.

1907. Thomas, Thomas Turner, M.D., Associate Professor of Applied Anatomy, and Associate in Surgery in the University of Pennsylvania; Surgeon to the Philadelphia General Hospital; Assistant Surgeon to the University Hospital. 1905 Chestnut St.

1896. Thorington, James, A.M., M.D., Emeritus Professor of Diseases of the Eye in the Philadelphia Polyclinic and College for Graduates in Medicine; Ophthalmic Surgeon to the Presbyterian Hospital; Ophthalmologist to the Ellwyn, Pa., Training School for Feeble-minded Children. 2031 Chestnut St.

1898. Thornton, Edward Q., M.D., Assistant Professor of Materia Medica in the Jefferson Medical College. 1331 Pine St.

1912. Torrey, Robert G., M.D., Assistant Physician to the Philadelphia General Hospital; Physician to the State Tuberculosis Dispensary. 1716 Locust St.

1896. Toulmin, Harry, M.D. Haverford, Pa.

1908. Tracy, Stephen E., M.D., Gynecologist to the Stetson Hospital; Visiting Surgeon to the Gynecean Hospital. 1527 Spruce St.

1901. Tucker, Henry, M.D., Genito-urinary Surgeon to the Philadelphia General Hospital; Curator of the Academy of Natural Sciences of Philadelphia. 1818 Pine St.

*1894. Tunis, Joseph Price, M.D. Churchville, Pa.

1901. Turner, John B., M.D., Ph.D., Assistant in the Ophthalmological Clinic, Methodist Episcopal Hospital. 1833 Chestnut St.

1897. Tyson, T. Mellor, M.D., Physician to the Philadelphia General Hospital; Physician to the Rush Hospital, the Philadelphia Lying-in-Charity Hospital, and the Children's Aid Society of Philadelphia. 1506 Spruce St.

ELECTED

1907. Ullom, Josephus Tucker, M.A., M.D., Member of the Staff of the Henry Phipps Institute; Visiting Physician to the Chestnut Hill Hospital. 24 Carpenter St., Germantown.

*1913. Vail, William Penn., B.S., M.S., M.D., Laryngologist to the Pennsylvania Institution for the Instruction of the Blind; Laryngologist to the Department for Tuberculosis of the Philadelphia General Hospital; Assistant Laryngologist and Otologist to the Out-patient Department of the Pennsylvania Hospital; Assistant Laryngologist to the Children's Hospital. Blairstown, N. J.

°1873. Van Harlingen, Arthur, Ph.B. (Yale), M.D., Emeritus Professor of Diseases of the Skin in the Philadelphia Polyclinic. 1831 Chestnut St.

1903. Van Pelt, William Turner, M.D. Consulting Ophthalmologist to the Episcopal Hospital. 1100 Widener Building.

1893. Vansant, Eugene Larue, M.D., Professor of Diseases of the Throat and Nose in the Philadelphia Polyclinic; Visiting Physician to the Throat, Nose, and Ear Department of the Howard Hospital. 1929 Chestnut St.

1912. Vaux, Norris Wistar, M.D., Surgeon to the Chestnut Hill Hospital; Surgeon to the Dispensary of the Germantown Hospital. 1807 Walnut St.

*1897. Veasey, Clarence A., A.M., M.D. Suite 404, Paulsen Building, Spokane, Wash.

†1883. Vinton, Charles Harrod, A.M., M.D. P. O. Box 464, Atlantic City, N. J.

1903. Wadsworth, William Scott, M.D. 3914 Baltimore Ave.

1906. Walker, John K., M.D., Physician to the Children's Hospital of the Mary J. Drexel Home; Physician to the Out-patient Department of the Pennsylvania Hospital. 2038 Locust St.

1907. Walker, Warren, M.D., Dermatologist to the Episcopal and Howard Hospitals; Assistant Dermatologist to the Pennsylvania Hospital. 206 Church Road, Ardmore, Pa.

1904. Walsh, Joseph, A.M., M.D., Visiting Physician to and Medical Director of the White Haven Sanatorium; Medical Director of St. Agnes' Hospital. 2026 Chestnut St.

1910. Ward, E. Tillson, A.M., M.D. 2006 Mt. Vernon St.

ELECTED

1895. Watson, Arthur W., M.D., Professor of Diseases of the Throat and Nose in the Philadelphia Polyclinic and College for Graduates in Medicine; Laryngologist to the Jewish Hospital; Laryngologist and Aurist to the Mt. Sinai Hospital; Laryngologist to Home for Incurables. 126 S. Eighteenth Street.

1886. Watson, Edward W., M.D., Physician to the Magdalene Home. 38 S. Nineteenth St.

1903. Weber, Charles H., M.D., Physician to the Dispensary of the Children's Hospital. 1736 Pine St.

1920. Weidman, Fred. D., M.D., Assistant Director, Laboratory of Dermatological Research, University of Pennsylvania; Assistant Pathologist, Philadelphia Zoölogical Garden and University Hospital. 242 N. Sixty-first St.

1906. Weisenburg, Theodore H., M.D., Professor of Neurology, Graduate School, University of Pennsylvania; Consulting Neurologist to the State Hospital for the Insane at Norristown and to the State Hospital for the Feebleminded and Epileptic at Spring City. 1909 Chestnut St.

1883. Welch, William M., M.D., Chief Diagnostician to the Bureau of Health, and Consulting Physician to the Municipal Hospital for Contagious Diseases; Consulting Physician to the Northern Dispensary and the Northern Home for Friendless Children. 1411 Jefferson St.

1913. Wells, P. Frailey, A.M., M.D., Ph.D. S. W. Cor. Fortieth and Brown Sts.

1893. Westcott, Thompson S., M.D., Associate in Diseases of Children in the University of Pennsylvania; Pediatrist to the Methodist Episcopal Hospital; Consulting Physician, Haddock Memorial Home. 1720 Pine St.

1884. Wharton, Henry R., M.D., Surgeon to the Presbyterian and the Children's Hospitals; Surgeon to Girard College; Consulting Surgeon to the Bryn Mawr Hospital, the Chestnut Hill Hospital, St. Christopher's Hospital for Children, the Pennsylvania Institution for the Deaf and Dumb, and the Pennsylvania Institution for the Blind. 1725 Spruce Street.

1901. White, Courtland Y., M.D., Director of the Pathological Laboratories of the Episcopal Hospital; Pathologist to the Children's Hospital and to the Kensington Hospital for Women; Chief Bacteriologist to the Bureau of Health, Department of Health and Charities, Philadelphia. 6611 N. Tenth St.

ELECTED

*1905. Whiteway, Harold M., M.D. 2356 W. Twenty-first St., Los Angeles, Cal.

1898. Whiting, Albert D., M.D., Surgeon to the Germantown Hospital; Assistant Surgeon to the Lankenau Hospital; Assistant Surgeon to the University Hospital; Instructor in Surgery in the University of Pennsylvania. 1523 Spruce Street.

1914. Willard, de Forest P., B.S. (Univ. of Penna.), M.D., Professor of Orthopedics, Post-graduate School, University of Pennsylvania; Orthopedic Surgeon to the Polyclinic, Orthopedic and Jewish Hospitals. 1630 Spruce St.

1907. Williams, Carl, B.S., M.D., Ophthalmic Surgeon to the Germantown Hospital; Instructor in Ophthalmology in the University of Pennsylvania; Ophthalmic Surgeon to the Pennsylvania Institution for the Deaf and Dumb. School Lane and Greene Sts., Germantown.

1920. Williams, Philip F., Ph.B., M.D., Assistant Professor of Obstetrics; Graduate School of Medicine, University of Pennsylvania; Instructor in Obstetrics, School of Medicine, University of Pennsylvania; Obstetrician to the Maternity Hospital of Philadelphia and Assistant Gynecologist to the Presbyterian Hospital. 262 S. Twenty-first St.

1915. Willits, Charles H., A.M., M.D., Medical Director of the Provident Life and Trust Company. 409 Chestnut St.

1916. Wilmer, Harry B., M.D., Assistant Instructor in Medicine, University of Pennsylvania: Assistant Visiting Physician and Assistant Neurologist to the Germantown Hospital; Visiting Chief to the Dispensary of the Germantown Hospital. 138 W. Walnut Lane, Germantown.

1874. Wilson, James Cornelius, A.M. (Princeton), M.D., Emeritus Professor of the Practice of Medicine and of Clinical Medicine in the Jefferson Medical College; Physician-in-Chief to the Lankenau Hospital; Emeritus Physician to the Pennsylvania Hospital; Consulting Physician to the Bryn Mawr Hospital. 1509 Walnut St.

1902. Wilson, Samuel M., M.D. 1517 Arch St.

1897. Wilson, W. Reynolds, M.D. 1709 Spruce St.

1904. Wister, James W., M.D., Physician to the Out-patient Department of the Germantown Hospital. 5430 Germantown Ave.

ELECTED

*1901. Witmer, A. Ferree, M.D. Freeport, Long Island, N. Y.

1918. Wolferth, Charles Christian, A.B., M.D., Associate in Medicine, University of Pennsylvania; Associate in Cardiac Pathology, William Pepper Laboratory of Clinical Medicine, University of Pennsylvania. 1704 Pine St.

1893. Wood, Alfred C., M.D., Assistant Professor of Surgery in the University of Pennsylvania; Surgeon to the University, the Philadelphia General, St. Timothy's, and the Howard Hospitals. 2035 Walnut St.

1900. Wood, George B., M.D., Instructor in Laryngology in the University of Pennsylvania; Assistant in the Clinic for Diseases of the Nose and Throat at the Polyclinic Hospital. 1830 Spruce St.

1903. Wood, Horatio C., Jr., M.D., Professor of Pharmacology and Therapeutics in the University of Pennsylvania. 1905 Chestnut St.

1880. Woodbury, Frank, M.D., Secretary to the Committee on Lunacy of the Board of Charities of Pennsylvania. 3345 N. Seventeenth St.

*1911. Woods, Andrew H., A.B., M.D., Union Medical College, Peking, China.

†1897. Woodward, George, M.D. W. Willow Grove Ave., Chestnut Hill, Philadelphia.

1913. Woodward, W. Wellington, M.D. 26 S. Church St., West Chester, Pa.

1903. Worden, Charles B., A.M., M.D. Princeton, N. J.

1889. Young, James K., M.D., Professor of Orthopedic Surgery in the Philadelphia Polyclinic; Clinical Professor of Orthopedic Surgery in the Woman's Medical College of Pennsylvania; Associate Professor of Orthopedic Surgery in the University of Pennsylvania. 222 S. Sixteenth St.

1894. Zentmayer, William, M.D., Professor of Ophthalmology Graduate School of Medicine, University of Pennsylvania; Attending Surgeon to the Wills Eye Hospital; Ophthalmologist to the Glen Mills School. 1506 Spruce St.

1899. Ziegler, S. Lewis, A.M., M.D., LL.D., Attending Surgeon to the Wills Eye Hospital; Chief Ophthalmic Surgeon to St.

ELECTED

Joseph's Hospital; Membre Société Française d'Ophthalmologie; Director of Public Health and Charities of Philadelphia. 1625 Walnut St.

1887. Ziegler, Walter M. L., A.M., M.D. 1418 N. Seventeenth St.

1895. Zimmerman, Mason W., M.D., Consulting Ophthalmic Surgeon to the Germantown Hospital. 1522 Locust St.

ASSOCIATE FELLOWS

(Limited to Fifty, of whom Twenty may be Foreigners)

American

ELECTED

1911. Abbe, Robert, M.D. 13 W. Fiftieth St., New York City, N. Y.

1909. Billings, Frank, M.D., 1550 North State Parkway, Chicago, Illinois.

1893. Councilman, William T., M.D., Harvard Medical College, Boston, Massachusetts.

1909. Crile, George W., M.D., 1021 Prospect Avenue, S. E., Cleveland, Ohio.

1909. Dana, Charles Loomis, M.D., 53 West Fifty-third Street, New York City, New York.

1892. Emmet, Thomas Addis, M.D., 91 Madison Avenue, New York City, New York.

1912. McCaw, Brig.-Gen. Walter D., M.D. Assistant Surgeon-General, U. S. A., Army Medical School, Washington, D. C.

1906. Mayo, William J., M.D., Rochester, Minnesota.

1906. Pilcher, Lewis Stephen, M.D., 145 Gates Avenue, Brooklyn, New York.

1906. Shattuck, Frederick C., M.D., 135 Marlborough Street, Boston, Massachusetts.

1894. Warren, J. Collins, M.D., 58 Beacon Street, Boston, Massachusetts.

1894. Weir, Robert F., M.D., 1155 Park Avenue (Ninety-second Street), care of Mrs. Ed. La Montayne, New York City, New York.

1892. Welch, William H., M.D., Johns Hopkins Hospital, Baltimore, Maryland.

Foreign

1890. Baccelli, Guido, Rome, Italy.
1908. Bannerman, W. B., M.D., General, I. M. S., 11 Strathearn Place, Edinburgh, Scotland.
1909. Macallum, Archibald B., M.A., M.B., Ph.D., Sc.D., LL.D., F.R.S., Department of Biochemistry, McGill University, Montreal, Canada.
1906. Myles, Sir Thomas, M.D., 33 Merion Square, W., Dublin, Ireland.
1898. Roddick, Thomas G., M.D., 80 Union Avenue, Montreal, Canada.
1908. Ross, Col. Sir Ronald, K.C.B., K.C.M.G., F.R.S., M.D., D.Sc., LL.D., 36 Harley House, London, N. W. I., England.

CORRESPONDING MEMBERS

1880. Carrow, Flemming, M.D., 823 David Whitney Building, Detroit, Mich.
1885. Rendu, Jean, M.D., Lyons, France.
1916. Estes, William Lawrence, M.D., South Bethlehem, Pa.
1916. Guitéras, John, M.D., Havana, Cuba.
1917. Miner, Charles H., M.D., Wilkes-Barre, Pa.
1917. Stevens, Cyrus L., M.D., Athens, Pa.

NECROLOGICAL LIST

FELLOWS

D. MURRAY CHESTON, M.D.,	December 22, 1919
SIR WILLIAM OSLER, Bart., M.D.,	December 29, 1919
HORATIO C WOOD, M.D.,	January 3, 1920
HILARY M. CHRISTIAN, M.D.,	January 8, 1920
FRANCIS T. STEWART, M.D.,	February 4, 1920
SAMUEL D. RISLEY, M.D.,	April 1, 1920
JOHN C. DA COSTA, Jr., M.D.,	April 26, 1920
ROBERT N. DOWNS, M.D.,	May 1, 1920
GEORGE S. GERHARD, M.D.,	October 27, 1920

ASSOCIATE FELLOWS

SIR THOMAS R. FRASER, M.D.,	January 5, 1920
WILLIAM C. GORGAS, M.D.,	July 4, 1920
JOHN C. REEVE, M.D.,	September 15, 1920

CORRESPONDING MEMBER.

CHARLES McINTIRE, M.D.,	January 4, 1920

LIST OF PRIZES AND LECTURES

THE WILLIAM F. JENKS MEMORIAL PRIZE

(Triennial)

1889	John Strahan, M.D.	Belfast (Ireland).
1895	Abram Brothers, M.D.	New York.

NOTE—June 12, 1900, the William F. Jenks Memorial Prize Fund was transferred to the Library as the "William F. Jenks Memorial Library Fund."

ALVARENGA PRIZE OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA

(Annual)

1890	R. W. Philip, M.D.	Edinburgh (Scotland).
1891	L. Duncan Bulkley, M.D.	New York.
1892	R. H. L. Bibb, M.D.	Saltillo.
1894	G. E. de Schweinitz, M.D.	Philadelphia.
1895	Guy Hinsdale, M.D.	Philadelphia.
1897	Joseph Collins, M.D.	New York.
1898	S. A. Knopf, M.D.	New York.
1899	Robert Randolph, M.D.	Baltimore.
1900	David de Beck, M.D.	Cincinnati.
1901	George W. Crile, M.D.	Cleveland.
1903	William S. Carter, M.D.	Galveston.
1905	D. Chalmers Watson, M.D.	Edinburgh (Scotland).
1907	William Louis Chapman, M.D.	Providence.
1908	William T. Shoemaker, M.D.	Philadelphia.
1910	M. Katzenstein, M.D.	Berlin (Germany).
1911	Francis D. Patterson, M.D.	Philadelphia.
1914	H. B. Sheffield, M.D.	New York.
1915	J. E. Sweet, M.D.	Philadelphia.
1917	Wilburt C. Davison, M.D.	Baltimore.

NATHAN LEWIS HATFIELD PRIZE FOR ORIGINAL RESEARCH IN MEDICINE

(Triennial)

1901	Henry F. Harris, M.D.	Atlanta.
1909	Martin Henry Fischer, M.D.	Oakland.
1917	A. B. Macallum, M.D., F.R.S.	Toronto.
1919	Harvey Cushing, M.D.	Boston.

NOTE.—November 29, 1913, by Supplemental Deed of Trust, the title of this Fund was changed to "Nathan Lewis Hatfield Prize and Lectureship."

WEIR MITCHELL LECTURES

Jan. 17, 1911	Arthur R. Cushny, M.D.	London.
Mar. 30, 1911	Edmund B. Wilson, Ph.D., LL.D.	New York.
May 16, 1911	Svante Arrhenius	Stockholm.
Nov. 3, 1911	William T. Porter, M.D.	Boston.
Mar. 29, 1912	William H. Howell, M.D.	Baltimore.
Oct. 21, 1912	G. H. F. Nuttall, F.R.S., M.D.	Cambridge (England).
April 4, 1913	H. P. Armsby, Ph.D., LL.D.	Pennsylvania.
Feb. 25, 1914	Harvey Cushing, M.D.	Boston.

PUBLIC LECTURES

Feb. 16, 1910	S. Weir Mitchell, M.D.	Philadelphia.
Nov. 17, 1910	Simon Flexner, M.D.	New York.
Dec. 15, 1910	William H. Welch, M.D.	Baltimore.
April 18, 1911	James G. Mumford, M.D.	Clifton Springs, N. Y.
Nov. 20, 1911	Talcott Williams, A.M., LL.D., Litt.D.	Philadelphia.
April 29, 1912	Owen Wister, A.M., LL.D.	Philadelphia.
Feb. 17, 1913	John K. Mitchell, M.D.	Philadelphia.
Feb. 15, 1916	Daniel J. McCarthy, M.D. and Walter Estell Lee, M.D.	Philadelphia.
April 15, 1916	Surgeon A. M. Fauntleroy	U. S. Navy.

MARY SCOTT NEWBOLD LECTURES

Mar. 29, 1917	A. T. McCormack, M.D.	Bowling Green, Ky.
April 4, 1919	Colonel Thomas W. Salmon, M.C., U. S. Army.	
Feb. 6, 1920	Alonzo E. Taylor, M.D.	Philadelphia.

MÜTTER LECTURES

1865	J. H. Packard, M.D.	Philadelphia.
1866	J. H. Packard, M.D.	Philadelphia.
1867	J. H. Packard, M.D.	Philadelphia.
1868	Harrison Allen, M.D.	Philadelphia.
1869	J. H. Brinton, M.D.	Philadelphia.
1872	J. da S. Solis Cohen, M.D.	Philadelphia.
1879	S. W. Gross, M.D.	Philadelphia.
1882	E. O. Shakespeare, M.D.	Philadelphia.
1885	H. F. Formad, M.D.	Philadelphia.
1888	O. H. Allis, M.D.	Philadelphia.
1890–1891	Roswell Park, M.D.	Buffalo.
1893–1894	De Forrest Willard, M.D., and Guy Hinsdale, M.D.	Philadelphia.
1896	O. H. Allis, M.D.	Philadelphia.
1899–1900	J. B. Roberts, M.D.	Philadelphia.
1901	H. W. Cushing, M.D.	Boston.
1902	L. A. La Garde, M.D.	Washington.
1903	C. N. B. Camac, M.D.	New York.
1904	G. H. Monks, M.D.	Boston.
1905	A. O. J. Kelly, M.D.	Philadelphia.
1906	W. J. Mayo, M.D.	Rochester, Minn.
1907	J. Rogers, M.D., and S. P. Beebe, M.D.	New York.
1908	G. W. Crile, M.D.	Cleveland.
1909	H. D. Fry, M.D.	Washington.
1910	T. W. Hastings, M.D.	New York.
1911	C. F. Nassau, M.D.	Philadelphia.
1912	J. C. Bloodgood, M.D.	Baltimore.
1913	R. C. Coffey, M.D.	Portland, Ore.
1914	F. H. Albee, M.D.	New York.
1915–1916	Rudolph Matas, M.D.	New Orleans, La.
1916	Nelson M. Percy, M.D.	Chicago, Ill.
1917	Chevalier Jackson, M.D.	Philadelphia.
1919	Alexis V. Moschcowitz, M.D.	New York.
1920	J. Chalmers Da Costa, M.D.	Philadelphia.

WEIR MITCHELL ORATION

1919	Charles W. Burr, M.D.	Philadelphia.

RICHARD H. HARTE

RICHARD HICKMAN HARTE

Remarks made at the Presentation of his Portrait to the College of Physicians

November 3, 1920

By FRANCIS R. PACKARD, M.D.

Among the striking features of the halls of our College there are none more pleasing to the eye than the many tokens of the affectionate esteem in which some of our Fellows, living or deceased, have been held by their professional colleagues. It is not our custom to delay the recognition of eminent merit until the Fellow who has possessed it is no more capable of realizing our appreciation of his worth. Among the pictures and tablets which pay silent tribute to our immortal dead will be found portrayals of the features and inscriptions recording the benefactions of many who are fortunately yet with us in the flesh. Such manifestations of regard and esteem to the living are decorous and seemly when spontaneously conferred by the will and desire of the recipient's Fellows and colleagues.

It is our custom to accompany such presentations to the College by some brief résumé of the salient facts in the career of the man whom the College delighteth to honor, and in accordance with this tradition it has fallen to my lot this evening to relate to you something of the life of our honored Fellow, Richard Hickman Harte.

He was born October 23, 1855, at Rock Island, Illinois. He received the degree of Doctor of Medicine from the University of Pennsylvania in 1878, his graduating thesis, indicating the bent of his mind, being written upon "Congenital Dislocation of the

Femur." After having served a term as resident physician in the University Hospital and a trip to Europe, in 1880 and 1881 he served as resident physician to the Pennsylvania Hospital, with which institution he was to be so closely identified throughout his active professional career, being elected surgeon to the Outpatient Department in 1883, and to the Hospital in 1893. For many years he was also surgeon to the Episcopal Hospital and in recent years he has distinguished himself by the zeal with which he continues to serve on its Board of Managers. He was also for many years surgeon to the Orthopædic Hospital, and consulting surgeon to St. Mary's, St. Timothy's and the Bryn Mawr Hospitals.

Dr. Harte was demonstrator of osteology at the University of Pennsylvania for a number of years, and subsequently was associate professor of surgery in that institution. There were two organizations in his profession in which he took a profound interest, but with the singleness of purpose and self-devotion which are so eminently his characteristics he labored for their welfare for many years ere both of them acknowledged his self-sacrifice by electing him to the highest office in their gift. I refer to the American Surgical Association and the College of Physicians of Philadelphia. From 1900 to 1909 he edited the *Transactions* of the former, and the high merit of those volumes is a testimony to his editorial capacity. He served the College of Physicians in the onerous position of Treasurer for some years, and was elected Vice-President in 1913 and President in 1916, serving in the latter capacity until 1919.

In spite of all these professional activities Dr. Harte was a frequent contributor to the literature of his profession. He contributed the Section on Surgery to the late Harrison Allen's *Handbook of Local Treatment*, and reported many surgical cases of great interest, and several memoirs, especially one on Dr. Physick and another on Dr. John Ashhurst, the eminent surgeon whom Dr. Harte always revered and honored as his own teacher and friend.

Dr. Harte's fondness for mechanics and his skill are well

known to his friends, and led him to devise many surgical appliances of great usefulness and benefit, besides aiding him greatly in mastering many of the problems of his art.

During his term as President of the College the United States entered the World War. Dr. Harte had foreseen the probability of the participation of our country in the struggle. In 1916 he had gone over to France and passed some time in work and observation at the famous American Hospital at Neuilly, just outside Paris, the field of labor in which his friend and colleague, Dr. James P. Hutchinson, so greatly distinguished himself. Upon his return to the United States Dr. Harte set diligently to work at the organization of a base hospital for service in case of need. He made an extended trip of inspection along the Mexican border studying the hospitals and sanitary regulations of the U. S. Army. He secured the coöperation of the Managers of the Pennsylvania Hospital, and with the aid of Miss Dunlop, the superintendent of nurses, and the doctors attached to the Hospital, he developed the Unit, subsequently designated Pennsylvania Base Hospital No. 10, which he conducted in France. This Unit departed from Philadelphia May 18, 1917. It was placed in charge of British General Hospital No. 16, at Le Treport, France, where it remained until it returned to this country, where it was mustered out of the U. S. service on April 26, 1919.

Limitation of space restricts an account of the splendid service rendered by Dr. Harte in connection with this great war work. The Unit made a good record in every particular and its success due to his inauguration was maintained by his skilful management. During the time when Dr. Harte was performing his arduous duties in France he suffered a terrible domestic sorrow in the loss of his wife, who had been Miss Maria Ames, of Boston. All those who were privileged to know her will recall her kindness of heart, gracious personality and keenness of mind. To her husband she was a wonderful helpmeet, and her interest in the Unit, shown in many ways, caused a feeling of personal loss to overshadow its members and added to their sympathy for their stricken leader. Dr. Harte stuck manfully to his post and never

let his private affliction interfere in the slightest degree with the performance of his public duty.

The British Government has officially recognized his services by bestowing upon him the decoration of St. Michael and St. George, and the Belgian Government by conferring upon him that of King Leopold II.

The portrait which we are now to have the pleasure of viewing was painted by Mr. Leopold Seyfert. It represents its subject in the dual capacity in which he figured in 1917–1918—as a Colonel in the U. S. Army, and in the official robes of the President of the College of Physicians of Philadelphia.

THE ANNUAL ADDRESS OF THE PRESIDENT

By WILLIAM J. TAYLOR, M.D.

It is my duty as President to address you at this the January meeting, and to give you a résumé of the work of the College during the past year.

I wish to thank you for the very great honor which you have done me in electing me your presiding officer and to assure you of my great appreciation of it, especially as this was done while I was still in service in the army overseas.

During the great World War, now happily ended, with the consequent upheaval and change of all of our habits and customs, it is a subject of congratulation that the meetings of the College have gone on uninterruptedly and that so much good scientific work has been accomplished. It is a source of much gratification to us all to know how splendidly the Fellows of this College have responded to the call of duty, and disregarding all personal and pecuniary considerations, placed themselves at the service of their government. Out of a total active Fellowship of 463 there were 216, or a little under one-half of the whole number, who held commissions in the army and navy. Of the remainder a very large proportion who were physically unfit for active service in the field and afloat, by reason of age and other disabilities, served their country in the Red Cross and on commissions and draft boards. This is truly a remarkable showing. Of those who served in the army, two offered up the supreme sacrifice: Major Alfred Reginald Allen, who was killed in action in France on September 30, 1918, and Dr. Henry Clement Walker, who

died of disease at the Walter Reed Hospital on May 2, 1918. Mention of their death was made in the address of our President last year, but I mention them again at this time.

Membership

The College has lost during the year by death 11 Fellows: Dr. James Tyson, a former President, who died February 21; Dr. William H. Wells, who died February 24; Dr. Walter H. Kremer, who died March 15; Dr. H. Augustus Wilson, who died April 16; Dr. William H. Bennett, who died May 14; Dr. Frederick P. Henry, for many years our Honorary Librarian, who died May 24; Dr. Abraham Jacobi, an Associate Fellow, who died July 10; Dr. Howard K. Hill, who died September 11; Dr. Henry W. Stelwagon, who died October 18; Dr. Nathaniel Gildersleeve, who died November 11; Dr. D. Murray Cheston, who died December 22, 1919.

The roll of the College December 1, 1919, includes 463 Fellows; 23 Associate Fellows, of whom 7 are foreign; 7 corresponding members; a total of 493.

At the meeting held April 2, 1919, upon the unanimous recommendation of the Council, Rudolf von Jaksch, Wilhelm Waldeyer and Paul Lazarus were expelled from Foreign Associate Fellowship as being alien enemies.

Of the 463 Fellows, 422 reside in Philadelphia or its immediate vicinity and 41 are non-residents.

Scientific Business

The scientific business of the past year comprises twenty-three papers on various subjects read at the stated meetings, while on June 6, at a special meeting, Professor Antoine Depage, of Brussels, read an interesting paper in French describing the work at the Ambulance de l'Ocean at La Panne; this was illustrated by lantern slides and was translated by Captain Van de Velde.

The second Mary Scott Newbold Lecture was delivered April

4, 1919, by Colonel Thomas W. Salmon, M. C., U. S. A., upon "War Neuroses and Their Lessons."

The first Weir Mitchell Oration was delivered by Dr. Charles W. Burr, entitled "Dr. S. Weir Mitchell as Physician, Man of Science, Man of Affairs, Man of Letters."

On December 12 the Mütter Lecture was delivered by Dr. Alexis V. Moschcowitz, of New York City, upon "Newer Conceptions of the Pathogenesis and Treatment of Empyema."

On December 16 the Nathan Lewis Hatfield Lecture was delivered by Dr. Harvey Cushing, of Boston, upon "The Major Trigeminal Neuralgias and Their Surgical Treatment."

At the stated meeting of the College November 5, Major D. H. Gilles, surgeon to the Queen's Hospital for Facial Reconstruction at Sidcup, read a very interesting paper upon "Plastic Operations upon the Nose and Eyelid," illustrated by lantern slides.

At the stated meeting of November Dr. Francis X. Dercum read a "Memoir" of the late Dr. Frederick P. Henry, and presented a portrait of him on behalf of his family. The College also received a portrait of the late Dr. John Armentieres Monges, which had been bequeathed to it by Miss Cora Monges.

The College has received legacies of $500 from the late Dr. James Tyson and $500 from the late Dr. G. G. Davis, both of these being designated as Publication Funds, and a bequest of the medical library of the late Dr. Henry W. Stelwagon with $3000 Prize Fund, the latter to become operative upon the death of his wife. The College has also received a bequest from the late A. Haller Gross, Esq., of $5000 for the purchase of books for the S. D. Gross Library.

Library

The very elaborate report of the Library Committee presented by its Chairman at the December meeting shows that there are in the Library a total number of 106,685 volumes as well as 9643 unbound theses and dissertations and 104,644 unbound pamphlets. During the year there have been received from all sources

4094 volumes, 12,503 pamphlets and 13,693 numbers of various journals. There has been an increase in the number of Fellows and other physicians using the Library.

A number of rare and valuable books have been presented to the Library, a full account of which with other interesting matter relating to our Library, will be found in the report of that Committee.

Directory for Nurses

The Directory for Nurses has had a very successful year, hampered as it has been by the large number of nurses who were in the war.

The Committee was able to make, as usual, a handsome addition to the income of the Library of the College. Our thanks are due to the Committee and employees for their very efficient management.

The Committee on Public Health

The Committee on Public Health and Preventive Medicine has carefully considered all the matters within its scope and has devoted much attention to the new Charter for Philadelphia. Mr. Powell Evans addressed the College on this subject February 5.

At a meeting of the Committee of the Council, consisting of the President of the College, the Chairman of the Committee on Public Health and Preventive Medicine, the Chairman of the Committee on Scientific Business, Dr. de Schweinitz, of the Censors, and the Secretary of the College, plans were considered to extend the public usefulness and influence of the College and the Standing Committee on Public Health and Hygiene authorized to arrange certain special meetings of the College at which topics of public interest should be discussed and recommended that these should be thrown open to physicians and laymen interested in public affairs. As a result of this, Professor Seneca Egbert made a most interesting and valuable report, at the December meeting, of a survey which he had made of the food inspection

and distribution in Philadelphia. This meeting was largely attended and various officials of the city and United States Government took part in the discussion. It is proposed to have other surveys made of conditions affecting the general health of the city.

Finance

The financial condition of the College is very satisfactory and our thanks are due to the Treasurer and the members of the Committee on Finance for the good judgment they have shown in their management of the investments of the College. With the increasing cost of all labor and materials it is very necessary for us to husband our resources and to exercise economy in our expenditures.

The annual volume of the *Transactions* of the College was, owing to unavoidable delay, not issued until late and is somewhat smaller than for several years past, but makes a creditable showing of the scientific work done—particularly in war medicine and surgery.

The proceedings of the Sections and record of their scientific activities have materially increased its value.

The Committee on Mütter Museum report the Museum to be in excellent condition and that many valuable specimens have been added to it. A particularly valuable collection of pathological specimens collected by Base Hospital No. 10 while in France has, through the courtesy of the British Government, been received and through its commanding officer, Dr. Richard H. Harte, deposited in the Museum. Each specimen is accompanied by a complete history of the case and will prove a most valuable addition to the Museum.

Council

The Council has with fidelity performed the duties imposed upon it. All matters referred to it by the College have been considered and many important items of business have originated

in the Council, and recommendations as to action to be taken have been submitted to the College.

A review of the work of the College would not be complete if mention were not made of the faithful and efficient services rendered by the Librarian and Superintendent, Mr. Charles Perry Fisher, and Miss Zelner, the Clerk of the College. To both our thanks are due.

ARTERIOSCLEROSIS IN WILD ANIMALS[1]

By HERBERT FOX, M.D.

The study reported here is a part of a general scheme of the Laboratory of Comparative Pathology at the Philadelphia Zoölogical Garden to place on record a review of the lesions found among the animals at the autopsy table, thus attempting to fulfill the objects of the collection, so aptly put in a quotation from Bacon's *New Atlantis*, that we have upon our walls: "We have also parks and enclosures of all sorts, of beasts and birds, which we use not only for views and rareness, but likewise for dissections and trials, that thereby we may take light what may be wrought upon the body of man." The subject of vascular disease was taken up as the first step in a study of the cardio-renal system and has led to some interesting observations. The morbid processes covered in this report include only those described in human pathology today as productive endarteritis and degenerative arteritis or arteriosclerosis; it will be called angeitis as a collective term. Among the animals domesticated by man these lesions have received scanty attention, possibly because their association with other lesions is not pronounced, but mostly because they are relatively rare. An accepted standard text-book, Hutyra and Marek, treats the subject casually, laying greater stress upon the varieties caused by parasites, while Zinserling questions whether arteriosclerosis, like that seen in the human being, ever occurs in the horse. Another author has observed it in heavily

[1] Read February 4, 1920.

worked draught horses. Arteriosclerosis has also been seen in dogs, and Kollisch states that the essential pathology is the same. The incidence among domesticated animals, as a whole, is not available, but it must be low. However, the occurrence of angeitis among wild animals is likewise not great, for we present the result of an analysis of 5464 autopsies, among which only 86 cases were discovered, that is about 1.5 per cent. The distribution of these cases is as follows:

Mammals autopsied, 1806; angeitis, 33 or 1.8 per cent.; birds autopsied 3571; angeitis, 53 or 1.4 per cent.; all others autopsied, 87; angeitis, 0.

Before going on with the consideration of the features of these groups and lesions, it might be well to consider for a space a few general facts concerning the similarities and differences among man, lower mammals and birds. In so far as the gross anatomy of mammals as a class is concerned there are relatively few differences, the cardiovascular structures being built upon the same general plan and the physiology being very similar. The minute structure is likewise much of the same kind, the elastic tissues being, however, rather more abundant in the lowest mammals. The physiology of birds, however, must be constructed on a somewhat different plan, because their anatomy is quite different and their habits require a mechanism to control the distribution of strain on the cardiopulmonary system. As a class birds are, per size, oversupplied with heart and vessels, especially the trident-like group of arteries at the base of the heart. This may be in the nature of a reservoir or as a part of the pressure-regulating mechanism. The heart and the origin of the three great vessels lie more free in the thorax, and they lack the support of the well-organized mediastinal tissue seen in mammalia. Great air sacs communicating with the lungs and bones surround this central system, which must therefore require adjustment when the birds fly high and low, dive or rise. These air sacs are present also in the abdomen and pelvis. I am unaware of any studies showing the operation of this mechanism or the seat of its control, and mention is only made to show that instead of a tissue pressure of more or less stability, as in mammals,

there is a variable air-pressure in Aves. The physiological circulation of the blood, while subject, of course, to anatomical variations, is really much the same as in mammals. Microscopically a difference exists in the walls of the bloodvessels, fibro-elastic tissue being more prominent than in mammals, apparently at the expense of muscle fibers; perhaps upon this may depend some of the pathological differences. Birds have a temperature considerably higher than mammals, in some genera rising as high as 112° F.; a few genera seem to be poikilothermous. There is nothing at hand to show that the cardiovascular control is otherwise than is known for the human being. The hypophysis, adrenal and thyroid, by some thought to be essential to control of the vessels, are larger on the average in animals whose habits demand severe or prolonged muscular effort. For this statement I have no measurements or weights, but it is a matter of daily observation at autopsies on cats, dogs, eagles on the one hand, and lemures, rodents and parrots on the other hand. In the bird the adrenal cortex is distributed with nervous tissue through the body, the medulla being bare as a yellowish-brown mass, lying at the upper pole of the kidney beside the sexual organ.

If to these anatomical differences between mammals and birds and the variations of habits and habitats among both classes one adds the element of captivity, it will be at once apparent there is a very great number of variables, so great that one hesitates to draw conclusions. All that can be done is to point out certain more or less obvious groups of facts, in hope that other later observations will piece them all together.

The effects of captivity, including unnatural food and the absence of the chase, are very difficult to evaluate. While every attempt is made at the Garden to approximate natural food, it is obvious that this must be incomplete and that gastro-intestinal pathology is inevitable. As a matter of fact it is the most important factor to be dealt with in zoölogical collections. The question of senility, natural and induced by captivity, has been mentioned in several connections with animal pathology, but its effect is as yet unsettled.

The division into proliferative and degenerative angeitis may be open to some objection, but as the etiology of neither condition is settled it is fair to consider under the former those changes which carry out the picture of the thrombo-angeitis proliferans or endo-arteritis obliterans. It happens that in our study five instances were discovered affecting vessels in or near frank inflammatory processes. The animals affected with this productive process were three birds, a rodent and an elephant. In the case of two birds and the rodent the process was associated with chronic intestinal lesions, while in the elephant it was found as an end-arteritis obliterans in large vessels of the lung of chronic pulmonary tuberculosis occurring in this animal.

Degenerative angeitis, arteriosclerosis, was observed in thirty-one mammals, the orders Primates, Carnivora, Marsupialia and Ungulata being represented, while Rodentia, Lemures and Chiroptera, of which we have many protocols, are missing; four of eleven orders are affected. The lesions take the form of roughened, rather opaque, intimal changes, with degenerations of the media, but there is usually missing that well-outlined, heaped-up, ulcerating, roughened intima so characteristic of late human atheroma and present to a slight extent in the Aves. One occasionally sees fatty yellow streaks in the lining, but they seem not to go on to calcification. The aorta is by far the most affected vessel, the lesions being usually present at the top of the arch and in the thoracic portion. There is one case among mammals and one in birds with the longitudinal ridging and opacity, but not the scarring, of syphilitic aortitis. Deformity is never great and aneurysms occurred only four times. Two instances of small sacculations in the aorta were found, a sort of Mönckeberg sclerosis; once also this occurred in a bird; these have not been cut to confirm the type named. Among the thirty-one cases ten show frank chronic renal disease, about equally divided between the degenerative and glomerular types. Six animals had myocarditis of fibroid nature, one, a monkey, showing distinct coronary sclerosis and concentric hypertrophy.

This type of arterial disease seems to affect a larger percentage of orders among the class Aves, twelve of seventeen being represented.

Fifty-one instances of degenerative arteritis are recorded, and of these, birds of prey, parrots, ducks and geese supply twenty-seven; ostriches and storks and gallinaceous birds, however, are well represented.

The birds of prey are divided into Falconidæ (hawks, eagles) and Catharidæ (condors, vultures). The former are aggressive, the latter timid, usually getting what is left after the former have finished, although accused by some observers of preferring spoiled meat; the two groups eat the same things at the Garden. They supply 39 per cent. of the cases among the Aves and 19 per cent. of the total reported. The lesions while most prominent in the aorta are found also in main branches and take the form of heaped-up, irregular, yellowish-gray intimal patches over degenerative media; the superficial deformity may be marked at times, but little scarring occurs. Calcification has not been seen, but certain patches are quite like those of the human lesions.

Parrots present exceptions to the general picture in birds, for their lesions are more common in the smaller vessels and strongly resemble senile arteriosclerosis, with its medial degeneration and calcification, as seen in man. Perhaps a considerable number of our specimens have been pets for a time, thus subjected to the effects of civilization. These birds are known to be long-lived, perhaps up to a century, and the process may be a real senile arteriocapillary fibrosis.

Gallinaceous birds, chiefly grain-eaters, show insular atheroma in sharply outlined areas, as do the larger aquatic birds, storks, herons and the like. The anserine birds vary very much in the type of lesions, as indeed they do in habits and habitat, but the larger ones, like geese, show quite clearly a patchy intimal overgrowth and fatty deposit with less evident mesial change.

Renal lesions of a chronic nature were apparent in seventeen of the fifty-one birds, very uniformly distributed in percentage among the various avian orders. Nephritis in birds is not yet well enough known to determine exactly all the varieties, but the degenerative type seems more prominent, glomerular forms being, however, clear at times. Ten birds showed chronic myocarditis. Three

aneurysms were found, two in geese and one in a vulture. In two of the eagle family a definite cardiac hypertrophy was noted, one in association with myocarditis and nephritis.

In only two cases of the whole eighty-six was chronic valvulitis noted, the aortic and mitral being involved, but the notes do not attempt to estimate the hypertrophy.

A word might be added concerning the occurrence of fatty deposits in the intima without evidences of sclerotic change. This lesion occurs commonly in the human being, not infrequently appearing in young persons, with and without acute infectious disease and without apparent reason for chronic vascular degeneration. Such a fatty deposition is exceedingly rare in wild animals, and, when it occurs, is more patchy than in human beings. It seems to be connected with infection.

Our study tends to confirm the general opinion of the rarity of arteriosclerosis in the lower animals, but perhaps a closer study will reveal more cases, especially since we know the groups in which it appears. It is most common in cats and dogs, bovines, predatory birds, parrots, gallinaceous and aquatic birds, and in these groups it is most definitely developed in those living on a protein diet. The lesion is very common in the orders showing the greatest number of cases of gastro-enteritis; this is especially true of parrots, aquatic birds and herbivorous and carnivorous mammals. The aorta is more affected in mammals; the disease is more distributed in birds. A rough similarity to the human aortic lesions is to be seen in the predatory birds and some of the carnivora, while the parrots exhibit degenerations in middle-sized vessels not unlike those of arteriocapillary fibrosis.

The animals most affected are those prepared by nature for severe or prolonged physical effort, such as in fight and flight. Aneurysms occur rarely, usually at points of branching and always near atheromatous plates; they are small and seem to retain part of all coats of the vessels, seldom becoming large enough to form their wall from the surrounding areolar tissue. More males than females are listed in the series, but as we have many more males on record, perhaps the difference would be less marked if the figures were closely comparable.

HUMAN ARTERIOSCLEROSIS. SOME REMARKS CONCERNING ITS ETIOLOGY AND SYMPTOMATOLOGY[1]

By GEORGE WILLIAM NORRIS, B.A., M.D.

Etiology. Arteriosclerosis is another term for aging. It means that the vascular domain, especially the arterial portion, and also other tissue cells are wearing out. There are some factors which we feel certain and others which we suspect speed up this aging process, yet in most instances we do not know the exact *modus operandi*. Among the factors which play an active part we find (1) the wear and tear of life; (2) infectious processes; (3) intoxications; (4) mechanical strain. The relative importance of these factors doubtless varies in individual cases, as does their relative importance in the opinion of many observers, who have given thought to the subject.

1. *The Wear and Tear of Life.* It is easy to grasp what is meant by this title; it is very difficult, if not impossible, in the present state of our knowledge to accurately explain the concrete sequence of causes and events.

Our first thought perhaps suggests heredity. We know that certain organisms and machines are more enduring than others —more capable of adjustment to surrounding circumstances and more resistant to certain types of strain; but unfortunately we often cannot assign the reason, nor do we know the exact nature of the strain. The influence of heredity is quite as impossible to explain, as is growth and longevity in different species of animals.

[1] Read February 4, 1920.

Why does the swan live so much longer than the sparrow, or the elephant than the mouse? Why do some individuals live to a ripe old age—having passed through hardships, physical strain, infectious disease, exogenous intoxications and severe trauma—while others succumb early and easily?

Oliver Wendell Holmes on being asked how a man should proceed in order to live to the age of seventy years, replied that he should pick his ancestors for one hundred years before he was born.

It is easy to show by mathematical formula the enormous and increasing strain to which the heart and arteries are subjected. Also that these strains may be and often are much enhanced by habits of life, such as severe muscular effort; and by causes such as chronic arterial hypertension. But again this leads us once more into the maze: Why the difference in individuals?

Some things, however, it appears, do exercise profound effects. It is agreed that the modern high-tension life, kept under the spur by ambition and competition, with inadequate mental relaxation and with insufficient physical exercise, which helps to redistribute blood and relieve congested vascular areas, does much to produce arteriosclerotic changes.

2. *Infectious Diseases.* It has been said with truth that "Venus loves the arteries." One of the definite advances of our knowledge within recent years has been the frequency with which *syphilis* produces disease of the aorta. It appears that although the involvement of this vessel is a frequent if not constant as well as an early lesion, its symptoms rarely manifest themselves with obtrusiveness for sixteen years. As an illustration of this, the Army experience may be quoted. Out of 1,000,000 men examined, 11,562 were injected for cardiovascular diseases, and among these only 20 men were found to have aortic aneurysm; even aortic insufficiency of luetic origin was not common. With syphilis as a known, important factor of arterial disease, and with the current estimate that about 15 per cent. of our population has been thus infected, many cases of arteriosclerosis are accounted for. Other infections, such as typhoid fever and tuberculosis, may also be held accountable for some cases. In addition to the clinical evidence,

aortic atheroma has been produced by the experimental injection of various pathogenic bacteria in animals. Focal infections doubtless also play a role.

3. *Intoxications.* Lead, alcohol and tobacco are regarded as potent factors. In regard to the former there can be no question. *Lead* may act (*a*) directly upon the bloodvessels, or indirectly through the production of (*b*) nephritis and (*c*) gout. The role of *alcohol* is more in doubt, and difficult to evaluate—owing to the coincident presence of other causes. As an important etiologic factor alcohol *per se* has certainly lost caste in recent years. Perhaps our great national experiment may in the future throw light on this subject. *Tobacco* establishes a far better claim as a noxious agent than alcohol. Experimentally the injection of nicotin in small quantities increases the secretion of epinephrin. Arterial lesions are readily produced by the injection of nicotin and blood-pressure changes can easily be demonstrated in human beings. In a certain type of arteriosclerosis, thromboangeitis obliterans, a Jewish heredity and the cigarette have been especially incriminated. And yet—when one considers the number of heavy users of tobacco who live to old age, one wonders how great a role tobacco plays.

4. *Mechanical Factors.* Arterial hypertension, often associated with nephritis, justly receives credit for many cases of arteriosclerosis. This may be more or less localized, as in the aorta and brachial arteries of the laborer, or in the cerebral sclerosis of the man who works with his brain. As a rule, however, the process is more generalized, although the heart or the brain may be the chief points of attack. As Osler has said, "The tragedies of life are largely arterial."

5. *Chemical Factors.* The whole trend of modern medicine is toward chemistry. Is it not natural to turn to chemistry as an explanation of our riddle?

(*a*) *Auto-intoxication.* Metchnikoff's conception of arteriosclerosis as a result of "auto-intoxication" due to production and absorption of poisonous products, putrefactive in character, and arising from the intestinal flora, has attracted much attention.

While the possibility of this hypothesis in some cases cannot be denied, it certainly has not been proved to be a constant or even frequent factor.

(*b*) *Internal Secretions.* Attempts have been made to show that arterial hypertension and vascular disease may result from disturbance of the internal secretions. We know that the medullary part of the adrenal gland, and the infundibular portion of the pituitary, are potent vasoconstrictors.

Arterial lesions are readily produced experimentally by the injection of epinephrin, although they differ in type from human arteriosclerosis. Much stress has been laid upon epinephrin as a factor in the causation of arteriosclerosis, it being believed that it acts chiefly by its effect on the vasa vasorum. Contraction or occlusion of these vessels would naturally impair the nutrition and resistance of the arteries. In some clinical cases of arteriosclerosis, disease of the vasa vasorum is the only change demonstrable. Such lesions may produce both intimal and medial necrosis. (Cowan.) Degenerative disease of the adrenal glands as seen in Addison's disease is associated with hypotension; but this line of reasoning apparently leads us astray, since the adrenal glands are, it appears, only emergency organs which are not concerned in the normal maintenance of blood-pressure, and an increased epinephrinemia cannot be shown to exist in chronic hypertensive disease. It is possible, of course, that an individual living under continued high tension, with periods of excitement and strain, may suffer some arterial damage from this cause, but that it is much of a factor cannot be maintained.

Again, the secretion of the thyroid gland exerts a marked influence upon the circulation, greatly increasing the work of the heart and the rate of blood flow, and dilating the peripheral vessels. Arterial thickening is a pronounced feature in long-standing cases, as is also cardiac hypertrophy. It has been suggested that an excessive protein diet acts through its effect upon the thyroid gland, it being pointed out that the plethoric gourmand presents many symptoms similar to those of hyperthyroidism, such as flushing, a sensation of warmth, palpitation, nervous irritability,

increased blood-pressure, etc. (Sajous.) There also appears to be an interrelation between the ovaries and other glands of internal secretion. Vasomotor disturbances are common at the time of the menopause and arterial hypertension is often first manifested at this time. These and many other thoughts along this line are suggestive and interesting, but largely speculative and not explanatory of the basic cause of arteriosclerosis.

(*c*) *Protein Metabolism.* If then the chemistry which we speak of as endocrinology fails to solve the riddle of arteriosclerosis, can we turn to a more fruitful field—that of metabolic chemistry? In this domain we are equally at a loss for an answer. It is probable that certain products resulting from the digestion of protein or the products of metabolic activity—protein catabolism—may exercise deleterious effects upon the vascular system, but experimentally the products of hydrolysis and amine formation from protein are dilators of vascular structures. As an example, histidine, one of the common amino-acids, may be mentioned. Of course it does not follow that only vasoconstrictors can produce arterial damage. Arterial lesions can be produced experimentally by the injection of toxins or epinephrin even if a rise of blood-pressure be prevented by the simultaneous injection of the nitrites. Clinically, it seems established that overindulgence in food, especially protein food, has deleterious results. Certainly the withdrawal of proteins and the restriction of food generally to the point at which only the nutritive needs are supplied is often followed by a great amelioration if not an actual disappearance of hypertensive symptoms.

Symptomatology. Bearing in mind the fact that arteriosclerosis is a general disease affecting not only the circulatory system, but probably also other tissues as well, it is not surprising to find that its symptoms may be practically coextensive with the ailments which flesh is heir to. It is equally obvious, inasmuch as arteriosclerosis is a normal biological development, which may begin at any age, that the early manifestations may be slight, vague, ill-defined and difficult to evaluate.

Many cases diagnosticated indigestion, biliousness, neuralgia,

neurasthenia, asthma, bronchitis are in reality the early manifestations of arterial disease. It is well to be skeptical regarding what appear to be purely functional derangements without demonstrable cause in individuals past middle life. It was doubtless with this or kindred thought in mind that the following advice was offered by an experienced practitioner: "When the patient complains of his stomach examine the heart, and when he complains of his heart examine the stomach." It is hardly necessary to recall the number of sudden deaths attributed to "acute indigestion."

It would profit but little to enumerate *in extenso* all the different symptoms which arteriosclerosis may occasion, but a few phases may perhaps merit allusion.

As is well known, sclerosis of the arteries is nearly always general, yet in a given case certain organs or systems are the chief sufferers. It is customary therefore to class the cases as (1) cardiac, (2) renal, (3) cerebral, (4) peripheral, (5) abdominal, (6) nervous. In each instance symptoms may arise as a result of spasm, diminution in caliber, thrombosis or rupture of a given vessel. Such symptoms are usually, but not always, brought on when an extra demand of blood, either locally or in other areas of the body, exists. Thus in the *cardiac* type one has as subgroups those in which (*a*) myocardial, (*b*) valvular, (*c*) coronary lesions and symptoms dominate the picture.

In the *renal* group one finds (*a*) cases associated with the contracted kidney and often with very marked secondary vascular changes resulting from toxemia and hypertension, and (*b*) those cases which show true red, beefy, sclerotic kidney and often exhibiting few if any urinary symptoms.

In the *cerebral* type one finds not only a loss of mental elasticity, an inability to concentrate attention, or to enjoy things that once made an appeal; but also psychasthenic manifestations, vagaries of conduct, or outbursts of excitement in people who had previously steered a straight course and kept an even keel. One also encounters amnesias and temporary failure, either partial or complete, of vision, hearing or consciousness; also aphasias.

The *peripheral* type is chiefly exemplified by vascular spasm,

intermittent claudication, spontaneous cramps, neuritic pain as in erythromelalgia localized gangrene, etc.

We must speak with less assurance regarding the *abdominal* type. Most often one sees flatulent indigestion simulating cholelithiasis or ulcer. The latter may actually exist as a result of localized endarteritis. A special type of angina, angina abdominis, has been described.

Finally in the *nervous* group one finds vertigo and even convulsions epileptiform in character. Such convulsions occurring in individuals past middle life, in the absence of syphilis, lead and uremia, usually have an arteriosclerotic basis.

Arteriosclerosis may occur in infants; and when one takes the trouble to look for it, is not infrequently found in young adults who may at the time show no symptoms of it. The symptoms in these cases usually do not appear until arterial hypertension becomes an added factor, and this in many instances may be years after the peripheral arteries first show definite thickening.

But according to the modern conception, as has already been stated, arteriosclerosis is a general disease. General, not only in its arterial distribution, but also in the fact that all the tissues of the body may show the effects of the disease, even independently of the disturbances which result from a diminished blood supply. In other words, the chemical changes which cause vascular disease, affect other tissue cells directly, just as they do the arterial walls.

Hence much attention has been focussed upon a so-called "presclerotic" stage. Only after this stage has advanced will one be able to demonstrate arterial changes. Still later, as the case progresses, definite evidences of circulatory, renal or cerebral failure, or a terminal infection will appear upon the scene. In the first stage, various and often ill-defined phenomena make their appearance.

The earliest stage is always difficult, sometimes impossible of recognition. Generally one notes what appear to be a beginning loss of bodily vigor, resistance to strain, or to infection, either with or without what appear to be slight functional derangements, involving the digestive, circulatory, renal or nervous systems.

Sometimes the only noticeable changes are those of the skin, which becomes dry, wrinkled and atonic, with a diminished sebaceous activity, a tendency to chap, and suggest a possible hypothyroidism. Or perhaps the patient may simply show an apparently causeless anemia.

There is in the minds of many much confusion between arterial hypertension and arteriosclerosis. Indeed the terms are unfortunately sometimes used interchangeably. Of course the two conditions are often simultaneously present, and prolonged hypertension often leads to arteriosclerosis. But that the reverse is true appears more than doubtful. To begin with, we are confronted with the great senile group whose arteries may be like pipe-stems, but whose pressures are practically normal. Secondly, we have the large group of hypertensive cases in whom the increased pressure begins in middle life, is maintained at a very high level, and precedes by many years the appearance of demonstrable arterial thickening. Third, it is not conceivable that a splanchnic vascular spasm can be maintained over months and years of life, especially without producing more local intra-abdominal disturbances than is the case; to say nothing of the fact that splanchnic sclerosis is but rarely demonstrated at autopsy.

In conclusion, it seems that clinical arteriosclerosis may simply be an involutional process, a part and parcel of aging; or it may be mechanical or toxic in origin. Just how this involutional process is brought about we are not in a position to state. But it seems more than likely that it will ultimately be shown to be the result of chemical changes associated with the bodily metabolism which exert their effects upon the individual visceral, vascular and somatic cells, either directly or through the mediation of the ductless glands.

DISCUSSION ON THE PAPERS OF DR. FOX AND DR. NORRIS

Dr. David Riesman: It is necessary to think of the cardioarterial system as we do of the cerebrospinal system, as one subject to disease at the center and at the periphery. We may directly compare enceph-

alitis and myelitis to myocarditis and aortitis, while neuritis corresponds to arteritis or arteriosclerosis. The analogy may be carried still further. Just as we have polyneuritis, so we have generalized arteriosclerosis; and just as we have local forms of neuritis, optic, brachial, sciatic, peroneal, so we have localized forms of arteriosclerosis. In one point the analogy falls—we have definite visceral arteriosclerosis, but no definite visceral neuritis, although future investigation may discover such a condition and predicate its symptomatology. I want to emphasize the fact that arteriosclerosis is not always a general process; it may be local in the lower extremities, in the retina, in the kidneys, in the brain, in the spinal cord, in the heart, as in the coronary artery, or it may be limited to the arch of the aorta. Furthermore, it is important to differentiate between hypertension, which is usually looked upon as synonymous with arteriosclerosis, and arteriosclerosis, with which it need not be associated. Hypertension conveys the idea of a functional process, and is often subject to great variations in the same patient. When hypertension and arteriosclerosis coexist, the sequence of events in my opinion is that hypertension precedes the arteriosclerosis and is the cause of the latter. Localized arteriosclerosis may or may not be associated with high blood-pressure. We may find coronary sclerosis, sclerosis of the retinal vessels and of the arteries of the lower extremities in persons with blood-pressures that are either not much above normal or even subnormal. For example, I have under observation now a patient with endoarteritis obliterans of the legs and intermittent claudication, who has a subnormal blood-pressure. Angina pectoris may be associated with hypotension. A distinction both anatomic and clinical must be drawn between arteriosclerosis producing leathery sinuous arteries like rubber tubing and that leading to calcified, beaded or pipe-stem arteries. The leathery form is the more serious, is usually associated with hypertension and in the majority of cases leads to apoplexy. It may or may not involve the kidneys, as tested by the routine methods. The other form, the decrescent type of Allbutt, is a senile condition, though occasionally seen in early life, even in childhood. The juvenile form of this type of arteriosclerosis, the atheromatous type, is usually associated with abnormalities in development, such as synostosis of the skull, or with endocrine disease. The calcification seems rather to protect the arteries against rupture than to favor it. Death in such patients usually occurs from a terminal infection or some form of obstructive gangrene. Arteriosclerosis is often a familial disease, both inits general and in its local manifestations. Hence, apoplexy and angina pectoris run in families. Knowing that acquired diseases are not hereditable, we must assume either a powerful common environmental factor, which is difficult

to conceive, or a fundamental defect in the germ plasm which limits the life of the arterial tissue. This is an interesting field for the biometrist.

In the etiology of arteriosclerosis, infectious diseases, and especially syphilis, play a large part. The spirochete and its toxin have a remarkable tropism for the arterial wall; less so, in my opinion, for the myocardium.

In the treatment the most important point is to discover methods of prevention, at least of detecting the disease in the making, as suggested by Sir James Mackenzie. We know pretty well the symptoms of the established disease, every text-book gives them, but the slight early changes have not received enough attention either on the part of the pathologist or of the clinician. A careful examination of the radials, brachials and temporals, the dorsalis pedis and retinal arteries, will prove helpful. Attention to the size of the heart and to the second aortic sound is also important; in this respect the facts recently pointed out by Hoover as to the factors involved in the loudness of the second aortic sound should be borne in mind. These and other points will probably help us in discovering early arterial changes at a time when the process may still be arrested or perhaps cured.

Dr. Alfred Stengel: Without meaning to make invidious distinctions, but because of the unusual ground covered, I was more than particularly interested in the presentation which Dr. Fox has made. From the standpoint of zoölogical observations may come some elucidation of many of the things which Dr. Norris later on referred to. The question of what is and what is not arteriosclerosis is, of course, one which each of the speakers practically intimated as being incapable of receiving a definite answer. Particularly Dr. Norris called attention to the common mistake regarding arteriosclerosis and hypertension as identical conditions, and I most frankly confess that I am aware of the fact that I have made this mistake very often in the past, and perhaps am making it now, though with a conscious effort at avoiding it. It is a matter of doubt in my mind whether there is a type of arteriosclerosis secondary to hypertension and another type not necessarily accompanied by hypertension, that is arteriosclerosis of another sort; also whether syphilitic disease of the arteries is in some cases to be ranked arteriosclerosis, while in other cases it occurs as a special and distinguishable form of arteritis. It seems to me fairly clear that syphilis, at least in the acquired form, does not play a part particularly in the development of what we ordinarily call arteriosclerosis as distinguished from definite syphilitic arteritis. Whether hereditary syphilis is a factor, in view of

the circumstance that man is especially subject to this disease and to arteriosclerosis, while the lower animals are not infected with syphilis and are much less prone to arteriosclerosis, has occupied my mind very often. I have been told by some of my friends that arteriosclerosis is not any less frequent among some savage tribes where syphilis does not occur. Whether that is a fact I do not know. I have been struck by the occurrence of early definite arteriosclerosis in individuals where there was history of hereditary syphilis or, at least, history of syphilis in the parent without manifest evidence of hereditary syphilis as we ordinarily understand it. I recently saw an example of this in a young man with influenzal pneumonia who had the most extreme ocular manifestations of sclerotic vessels I have ever seen in the human eye. He had also very distinct sclerosis of his peripheral vessels with very low tension. The family physician told me that the father of this patient has been under his care and was syphilitic before the birth of the boy. The young man has none of the stigmata of syphilis, but this pronounced evidence of arterial disease and also the condition of the eye strongly suggested a syphilitic taint.

Some of the things concerning arteriosclerosis about which I frankly confess I am confused are difficulty in determining the border-line between the case of hypertension, to begin with, and arteriosclerosis in the end. I confess myself to be in a large way a believer in the views of Allbutt, although not accepting the explanation which he gives. I do not believe the hyperpiesis upon which he lays so much stress is the important factor leading to the development of high tension and to changes in vessels later on; but that nutritional disorders and hypertension are an important foundation of arterial sclerosis I am profoundly convinced. Investigation undertaken in such a spirit of open-mindedness as has been exhibited in these papers tonight, will doubtless lead us to know something more about arteriosclerosis than we do at present. We recognize a disease in its final development, and the probability that there may be half a dozen fundamentally different onsets seems to me to lie open to consideration. Arteriosclerosis is an end-result. The question is, Where and how does it begin? I have no doubt there are many different forms of disease which terminate in this condition.

Dr. F. X. Dercum: Will Dr. Norris say something concerning the relative frequency of arteriosclerosis in the sexes? Mental and nervous affections due to arteriosclerosis predominate greatly in the male. Arteriosclerotic dementia, for instance, is quite rare in the female, while intermittent claudication is practically a male disease.

Dr. Norris (closing): Replying to Dr. Dercum, I have made no exact study of the subject, and without a large statistical compilation it would be impossible to decide the question. My impression is, however, from observations in hospitals and private practice that the condition is very much more frequent in the male than in the female. I have never seen intermittent claudication in a woman. One sees very many less cases of aortic aneurysm in women than in men. One rarely sees extreme degrees of pipe-stem arteries in women.

THE USE OF DRUGS IN OIL INTRAVENOUSLY[1]

By H. R. MILLER, M.D.[2]

We believe that we have been able to establish that we may measure the contrasting short and prolonged effects of the same drug (adrenalin) when given in water and in oil respectively, and that the latter vehicle shows evidence of producing an unusually prolonged effect of the drug employed.

The intravenous use of drugs in oil and of oil itself presents interesting phases. A small dose of sterile olive oil administered into the marginal ear vein of a normal rabbit is very likely to cause immediate death in the animal. We have found that dogs, however, appear to show a greater tolerance to olive oil injected intravenously. In our hands, we have given to dogs olive oil intravenously in amounts ranging from 1 to 35 c.c. at one time, the total amount of oil for one animal over a period of five weeks reaching about 260 c.c. We are investigating the blood of such dogs while they are receiving repeated intravenous injections of oil, and we are engaged in studying the lipase, lecithin and cholesterol determinations, as well as the CO_2 volume per cent. of plasma, the sugar level and the possible changes in the formed blood elements.

We can report at this time on the behavior of two drugs, adrenalin and crystalline strophanthin when used in oil intravenously. A number of experiments were carried out with nitroglycerin and the same principle of action appears to hold here also.

[1] These experiments were carried out in the Pharmacological Department of the College of Physicians and Surgeons, Columbia University. We are indebted to Dr. Lieb, the head of this department, for his help and courtesy.

[2] Read April 7, 1920.

Adrenalin in aqueous solution when given intravenously causes an immediate and striking rise in blood-pressure. The next few moments there may be a marked irregular, erratic action; there is then a swift and quite uniform descent in blood-pressure to normal level. The entire reaction consumes a very few minutes and obviously its character and, to an extent, its duration depend upon the size of the dose, the length of time it is given, and the amount of diluent used. Identical doses of adrenalin in oil given intravenously cause a gradual, and, as a rule, an even rise in blood-pressure; there is a rather uniform, prolonged, gradual descent of the blood-pressure until the normal level is reached. Here, then, we have no abrupt mounting of the blood-pressure; as a general rule an even as opposed to an erratic subsequent effect, and a total duration of about fifteen to twenty-five minutes as contrasted with the transient duration of the effect from aqueous administration.

We have noted also that 0.1 mg. of adrenalin with 0.3 c.c. of olive oil given intravenously will produce a definite, pronounced effect, while a same dose given in 1 c.c. of olive oil for instance produces a milder result, and a same dose again in a still larger amount of olive oil produces almost no demonstrable effect on the kymograph or clinically. It would, therefore, seem that, in addition to the factors of size of dose of drug and time of duration of administration, it is also of advantage, when using adrenalin in oil intravenously, to use small amounts of oil.

This same advantage, or rather phenomenon, holds for the use of strophanthin in oil intravenously. When a lethal dose of crystalline strophanthin in aqueous solution is given intravenously to a dog the effect observed is rather prompt. Often there is arrhythmia. There may be a rise of the blood-pressure level of 20 to 30 mm. of Hg., and in a few minutes there is a diastolic drop and death.

A lethal dose per kilo weight of dog of strophanthin with olive oil given intravenously produces a very slow, gradual but pronounced effect. Such an effect we have noted to last several hours after administration of the drug. In our experiments, from

the use of strophanthin in oil no death was encountered. With the use of smaller doses of strophanthin, we have observed that aqueous administration of the drug produces a very early effect which lasts about sixty to eighty minutes; oil administration of the drug produces a delayed effect which, when manifested, lasts approximately five hours. We considered, at least, 0.12 mg. of strophanthin in aqueous solution per kilo weight of dog as a lethal dose when injected intravenously in a few seconds.

This report is presented as a preliminary communication. We believe it is safe to state that the drugs we have used in oil vehicle may be employed subcutaneously and intramuscularly. In our limited experience with dogs and man, no harmful results were noted. Clinically, it may be feasible to employ drugs in oil vehicle to produce a prolonged effect from the slowly absorbing local depot, as in urticaria, bronchial asthma, etc., when using adrenalin.

Conclusions. The injection of oil into the moving blood stream of a rabbit is practically always fatal—the effect of embolization.

The likelihood for fatal embolization in the dog does not seem to be great. In the small non-lethal embolization, clinically, there are no marked signs or symptoms—even though 10 c.c. of olive oil was given repeatedly at one time.

In man small amounts of olive oil *per se* or with drugs administered intravenously have thus far caused no clinical signs or symptoms of embolization. It is important that a very careful clinical search should be made for such signs or symptoms.

Therapeutically, it remains to be demonstrated whether it may be of advantage to use drugs in oil intravenously to procure a prolonged drug effect without the initial abrupt phenomenon.

DISCUSSION

Dr. A. N. Richards: Dr. Miller was kind enough to inform me rather fully of his results several days ago, and in consequence I have had time

enough to consider them and to make a few simple experiments on the subject which he has presented. It has been possible to confirm his statements concerning the behavior of adrenalin intravenously injected in oil as compared with the same substance intravenously injected in watery solution. The chief point which should be emphasized is this, that the intravenous injection of an oily solution of a drug is quite a different thing from that of a watery solution. When the watery solution is introduced it is immediately distributed throughout the blood stream and at once reaches all the tissues to which the blood has access. When injected intravenously in oil solution it goes to the lungs, is laid down there in the form of fat emboli, and from these oil droplets it diffuses out into the blood which impinges upon them and so reaches the systemic circulation slowly and in low concentration; hence, the decreased intensity and increased duration of the action. The oil injection results in the formation of a depot in the pulmonary vessels and for this reason the events involved seem to me to differ fundamentally from those associated with intravenous injection of a watery solution.

These statements are made on the basis of a few experiments which I have made and some of those which Dr. Miller reports. For example, he shows that increasing the amount of oil in which a dose of adrenalin is dissolved decreases the effect of that dose. I found less effect from 0.5 mg. of adrenalin in 0.5 c.c. of oil than from 0.1 mg. adrenalin in 0.1 c.c. of oil. I interpret this to mean that the size of the emboli and the extent of the embolism affects the diffusion of the dissolved adrenalin out into the blood stream.

In another experiment I compared intravenous with intra-aortic injections of oil and water solutions of adrenalin; 0.1 mg. of adrenalin in 0.1 c.c. of water injected into the femoral vein gave a rise of blood-pressure of about 100 mm. of mercury, the action lasting for slightly more than three minutes. Injection of the same solution in the same amount into the aorta by a tube pushed downward in the carotid artery gave practically identical result with the exception that the action came on slightly sooner. The intravenous injection of 0.1 c.c. of oil by the femoral vein gave a maximum rise of blood-pressure of 18 mm. and the action lasted for about fifteen minutes. Intra-aortic injection of the oily solution in the same amount gave a maximum rise of 24 mm. of blood-pressure and the action lasted only three minutes. The reason for this difference seems to be this: The intravenously injected oil solution of adrenalin is deposited in the pulmonary vessels; adrenalin is not destroyed in its passage through pulmonary capillaries, hence as it is dissolved out into the blood passing through the lungs it exerts its action on the smaller vessels of the greater circulation. When introduced in oil directly into

the aorta it at once takes the form of emboli in the greater circulation. The embolic obstruction and the adrenalin acting at the site of the embolism cause transitory rise of blood-pressure, but the adrenalin which diffuses out of the emboli into the blood stream is destroyed in passage through capillaries of greater circulation and hence can exert no lasting action. In either case emboli are formed.

It is generally known that fat embolism of a moderate grade may exist without the production of untoward symptoms, and it may be that a method of drug administration which involves the production of fat embolism will not be associated with serious danger. It should be recalled that strophanthin, the second of the drugs which Dr. Miller has used, is not a bland substance and it seems quite conceivable that its presence in oil droplets in the pulmonary capillaries might be productive of a local reaction.

Fifteen years ago Meltzer and Auer emphasized the possibilities connected with intramuscular injections. I have one experiment in which intramuscular injections of 0.25 mg. adrenalin in water gave results similar to the intravenous injection of 0.1 mg. adrenalin in oil.

Insofar as laboratory experiment gives me the basis for a judgment concerning the method suggested by Dr. Miller it would be to this effect: That if an emergency exists which demands the certainty of dosage, distribution and action which intravenous injection implies, watery solution should be used; if "abrupt" effects are feared the intramuscular method may be as effective as and is safer than intravenous injection in oil.

SOME NEWER CONCEPTS IN DIGITALIS THERAPY[1]

By CARY EGGLESTON, M.D.

Not quite twelve years ago Mackenzie published his epoch-making work on *Diseases of the Heart*, which marked the beginning of a revolution in our knowledge of the physiology and pathology of that important organ. At about the same time Einthoven brought forth his string galvanometer as a clinical instrument for the scientific study of the mechanism of the heart-beat; and through the work of Mackenzie the polygraph had become an instrument of great clinical value. We were thus, all at once, provided with a new outlook upon the functions of the heart in health and disease and with instruments of precision for the study of these functions. During this brief span of years our knowledge of the heart's normal and pathologic physiology has been advanced far more than it had in the preceding century, and with this advance there came the opportunity for the more accurate investigation of the action of drugs upon the heart in man. Many such investigations have been made with reference to the actions of digitalis and the digitalis bodies, and it is with the results of some of these that the present paper is concerned.

Slowing of the heart has been regarded as one of the characteristic actions of digitalis in man ever since it was first observed by Withering. The most superficial observation should have revealed that this action often fails to appear even when the administration of digitalis is followed by beneficial effects. We now know that the only large group of cases in which digitalis produces marked reduc-

[1] Read April 7, 1920.

tion in the heart-rate is that of auricular fibrillation. With but two exceptions the therapeutic administration of digitalis is seldom followed by a significant degree of slowing of the heart-rate in the presence of the normal sinus rhythm. The two exceptions are those cases of heart-failure in which marked edema is present and those with hypodynamic, unstable hearts in which the rate is generally rapid but is subject to spontaneous fluctuations. In both of these digitalis generally produces considerable slowing. Finally, slowing of the heart is seen in man not infrequently as one of the common manifestations of digitalis intoxication, when it is due to the production of some degree of heart-block. When the normal sinus rhythm is present, therefore, slowing cannot be regarded as one of the primary characteristic therapeutic actions of digitalis. The recognition of this fact is of considerable therapeutic importance—it reveals the fallacy of one of the chief objections advanced ed against the administration of digitalis in cases of heart failure due to aortic insufficiency, and recent clinical experience has shown that digitalis is not only not contra-indicated in such cases but is often of great value for the relief of the failure. It should be said, however, in this connection that heart-failure does not usually result from aortic insufficiency until a late stage, when the contractile power of the ventricular musculature has been greatly exhausted. Therefore, while digitalis is not contra-indicated its administration not infrequently fails to relieve the heart-failure. There is no satisfactory evidence, however, that its judicious employment is ever harmful in such cases, and it should always be given a trial.

The mechanism by which digitalis produces slowing of the heart has been the subject of recent investigation, especially by Cushny, Marris and Silberberg,[1] Cushny[2] and others. It has long been known, as demonstrated in animal experiments, that digitalis stimulates the vagus center in the medulla and thereby reduces the rate of the heart in one of two ways: Either the rate of the whole heart is diminished by depression of the rate of impulse formation

[1] Action of Digitalis in Therapeutics, Heart, 1912–13, iv, 33.
[2] Digitalis in Auricular Fibrillation, Jour. Pharm. and Exp. Therap., 1918, ii, 103.

in the sinus or the rate of the ventricles alone is reduced through depression of auriculoventricular conduction to a degree sufficient to cause partial or complete heart-block. The former, slowing of the whole heart, is the type commonly found in patients presenting the normal sinus rhythm—that is, in patients with the hypodynamic heart and in those with edema. The latter, as has been mentioned, is commonly a manifestation of minor intoxication by digitalis, and also occurs chiefly in hearts with the normal rhythm.

It has been said that digitalis is contra-indicated in cases of partial heart-block, and in those in which there is evidence of impaired conduction, as shown by prolongation of the *A-V* or *P-R* intervals. It has also been stated that marked prolongation of conduction time and partial heart-block occur in man from the use of digitalis only in cases previously showing some impairment of conduction. Neither of these contentions is wholly correct. Extensive clinical observations have shown conclusively that while there is an increased tendency for digitalis to enhance a preexisting depression of conduction or partial block it is by no means contra-indicated in cases of this type. In many such cases it may be administered with satisfactory results without further prolongation of conduction time or increase in heart-block. In others the block, or impaired conduction, seems to be largely secondary to the existence of the heart-failure, and when digitalis relieves the failure the block may disappear or the conduction time may be shortened. Finally, if the administration of digitalis does show a tendency to increase an existing impairment of conduction this can generally be overcome by the administration of suitable doses of atropin to depress the cardiac endings of the vagus and thereby remove the effects of the central stimulation. While digitalis is not contra-indicated in cases with impaired conduction it should always be administered with caution and the patient should be observed at frequent intervals, always with the aid of instrumental methods if possible, to detect at once any increased depression of conduction should it develop.

The belief that therapeutic doses of digitalis do not frequently depress conduction in man unless there is an existent impairment

of this function has been overthrown by Cohn[1] and by White and Sattler,[2] who have shown that some delay in conduction time is an almost invariable phenomenon of digitalis action even in normal persons. It is true, however, that the depression is not usually very marked until the stage of minor digitalis intoxication is reached. The prolongation of conduction time may progress gradually during the administration of digitalis or it may develop suddenly. It seems quite probable that the delayed conduction may constitute an action of digitalis which is of some therapeutic value in cases in which the rate of the heart is not altered even though the delay be small. The interval between the auricular and the ventricular contractions is increased by the time by which conduction is prolonged, and even when this does not exceed 0.02 of a second it means a considerable increase in the time allowed for the auricles to empty into the ventricles. This should be quite sufficient to increase materially the amount of blood flowing into the ventricle, especially in cases of mitral stenosis, and thereby improve the circulation.

Recognition of the capacity of digitalis to depress auriculoventricular conduction through stimulation of the vagus center and the discovery of the fact that its striking capacity to slow the ventricular rate in auricular fibrillation is due to the blocking off from the ventricles of many of the feebler auricular impulses, led to the tacit assumption that this block was also dependent upon central vagus stimulation. Cushny and his associates, however, observed that the block produced in auricular fibrillation, unlike that in the regular heart, could not in many cases be abolished by depression of the vagus endings in the heart by atropin. That is, they found that before digitalis was given the administration of atropin produced a greater acceleration in ventricular rate than followed the same dose when given after the ventricles had been slowed by digitalis. They thereupon investigated the mechanism of the slowing produced by digitalis in man, in intact animals and

[1] Clinical and Electrocardiographic Studies on the Action of Digitalis, Jour. Am. Med. Assn., 1915, lxv, 1527.

[2] Effect of Digitalis on the Normal Human Electrocardiogram, with Especial Reference to A–V Conduction, Jour. Exp. Med., 1916, xxiii, 613.

in perfused, isolated animals' hearts, and concluded there are two types of mechanism by which this is accomplished. Type A is purely inhibitory through central vagal stimulation; it can be antagonized by paralysis of the vagus endings with atropin, and it is the mechanism commonly found in the presence of the normal sinus rhythm. Type B is the result of a direct action of digitalis on the conducting tissues to depress their functions; it is unaffected by atropin, and it is the mechanism involved in most cases of auricular fibrillation and in rare instances when the rhythm is normal. It occurs typically in animal hearts which have become malnourished by long perfusion, and Cushny suggests that it rests largely upon the existence of malnutrition. He believes that it is common in auricular fibrillation because that condition especially favors the development of malnutrition of the human heart.

The accuracy of Cushny's observations is not to be doubted, but we believe that his conclusions are too sweeping. In the first place Cushny's own observations do not seem to exclude all participation of the vagus inhibitory action, for while he shows that the administration of atropin produces a greater acceleration in ventricular rate, both actual and proportional, when the heart is not slowed by digitalis than when it is, his records also show that atropin does accelerate the rate even when it has been greatly slowed by digitalis. This seems to indicate the existence of some vagal inhibition, and his arguments to the contrary are not altogether convincing. Further, his contention that the slowing is produced by a direct action of digitalis upon the junctional conducting tissues does not seem to have been proved by his experiments, although the action is evidently upon some structure distal to the vagal endings. Cohn and Fraser[1] have shown that even when the administration of atropin fails to restore the heart-rate to its previous level after it has been slowed by digitalis, the atropin, nevertheless, always removes completely whatever delay in conduction the digitalis may have produced. The whole matter is in need of further investigation. So much for the mechanism by which digitalis slows the human heart.

[1] Certain Effects of Digitalis on the Heart, XVIIth Int. Cong. Med., 1913.

Let us now briefly consider the therapeutic value of reducing the rate of the ventricles or of the whole heart. We have already indicated how simple prolongation of conduction time may be of value in mitral stenosis. Reduction in the rate of the heart, or that of its ventricles, is accompanied by a lengthening of the diastolic or resting-phase of the ventricles, while the duration of the systolic phase is but little altered. This lengthening of diastole allows a larger volume of blood to flow into the ventricles and gives time for a more complete recovery of their contractile power. The force and volume output of ventricular systole are thus increased, and since more blood is thrown into the aorta and diastole is prolonged, coronary circulation is increased, the nutrition of the ventricular musculature is improved and internal respiration is more perfect in the ventricles. These secondary results are especially pronounced in cases of auricular fibrillation because of the added fact of the elimination of the frequent abortive ventricular contractions which exhaust the contractile power and do not contribute materially to the nutrition of the ventricular musculature. It should be mentioned in this connection that while digitalis so effectively slows the ventricles in auricular fibrillation the rate and the fibrillation of the auricles are not altered.

While slowing alone can account for all of those beneficial effects of digitalis in man which lead to the restoration of the failing heart and secondarily to the disappearance of the patient's symptoms, it is far from being a constant effect. The contention that the beneficial effects of the administration of digitalis are wholly attributable to its capacity to slow the heart is not supported by the facts, for there are many cases in which digitalis is quite effective in restoring the failing heart, although it does not alter its rate. The experiments of Gottlieb and Magnus[1] and others on the isolated perfused heart, demonstrate that digitalis is capable of producing a marked increase in the volume output of the ventricles per beat, both by increasing the extent of diastolic filling and the completeness of systolic emptying. They also show that the force of ventricular systole is markedly increased by digitalis. These

[1] Digitalis und Herzarbeit, Arch. f. exp. Path. and Pharm., 1904, li, 30.

actions are necessarily exerted directly upon the ventricular musculature, since they occur in the heart after its removal from the body. Francois-Frank observed similar results from the administration of digitalis to living animals. These experiments suggest the existence of a similar direct action of digitalis on the human heart to increase the force and volume of ventricular systole. Although there are no methods available for proving the existence of such an action in man, it seems highly probable that it does occur for the following reasons: In the first place the alterations in the T wave of the electrocardiogram, which Cohn, Fraser and Jamieson[1] have shown to occur commonly early in the course of the administration of digitalis to man, are apparently due to a direct action of the drug upon the myocardium. Cushny's observations, previously discussed, also seem to prove that digitalis exerts considerable direct myocardial action in man, and there is every reason to believe that the production of ventricular premature contractions by digitalis is the result of a direct muscular action. There is evidence, therefore, that digitalis does act directly upon the human myocardium. In the second place we know that digitalis is capable of relieving heart-failure and restoring cardiac efficiency in cases in which it produces no slowing, and even in cases of complete heart-block. It is impossible to account satisfactorily for its effects in such cases except by assuming that it increases the force or magnitude, or both, of ventricular systole.

We have seen that digitalis may exert one or more of the following actions in man when administered in therapeutic doses:

1. It may slow the rate of the whole heart through stimulation of the vagus center.

2. It may prolong the time of auriculoventricular conduction through a similar action.

3. It may slow the rate of the ventricles, either by the production of some degree of heart-block through central vagal stimulation or by virtue of some direct action on the heart.

4. It seems probable that it may exert a direct action on the

[1] Influence of Digitalis on the T-wave of the Human Electrocardiogram, Jour. Exp. Med., 1915, xxi, 593.

myocardium which results in an increase in the force or magnitude, or both, of ventricular systole.

These, and these alone, seem in the present state of our knowledge to be the primary therapeutic actions of digitalis, but their secondary results are limited only by the conditions existing in the given case of heart-failure. By them the failing heart is restored and the circulation of blood through the body is improved.[1] The blood is more perfectly ventilated in the lungs; stasis and congestion are overcome; dyspnea, orthopnea, cyanosis and cough diminish and finally disappear; edema and transudates are absorbed; diuresis is produced.

Before leaving the subject of the clinical pharmacology of digitalis a few matters demand brief discussion because they do not even yet seem to be clearly understood by all. The impression that the existence of a high systolic blood-pressure in a patient with heart-failure contra-indicates the administration of digitalis seems still to linger in the minds of many. The subject of the influence of digitalis on the blood-pressure in man was discussed a few years ago,[2] and it was shown that the vasoconstriction which could be demonstrated to occur in animals and in isolated surviving vessels under the influence of digitalis took place only when amounts of the drug were used which were far in excess of any which could possibly be given to man. It was shown that there is no evidence that either digitalis or digitoxin has any direct action on the bloodvessels when given to man even in large therapeutic doses. A large number of careful observations of the effects of the administration upon the blood-pressure in man were analyzed and it was found that the changes in the systolic and diastolic pressures are generally relatively slight, the tendency being for the pressures to be altered in the direction of the normal. There is a marked tendency for the pulse-pressure—the difference between the systolic and diastolic pressures—to increase under the influence

[1] Stewart, G. N., and Scott, R. W.: Change Produced in the Bloodflow (in the Hands) under the Influence of Digitalis in Cases of Auricular Fibrillation, Jour. Pharm. and Exp. Therap., 1915, vii, 263.

[2] Eggleston, Cary: Influence of Large Doses of Digitalis and Digitoxin on the Blood-pressure in Man, Jour. Am. Med. Assn., 1917, lxix, 951.

of digitalis, chiefly through reduction of the diastolic pressure, in cases of heart-failure in which the failure is relieved. A decided fall in the systolic pressure is to be anticipated when digitalis relieves heart-failure in cases in which it is accompanied by a high systolic pressure and marked edema. There is also a marked tendency for digitalis to reduce the systolic pressure from its high level in cases with marked dyspnea, cyanosis and circulatory stasis. All of the facts, therefore, show conclusively that digitalis is not contra-indicated by the existence of high blood-pressure.

A closely related matter is that of the possible action of digitalis on the human coronary arteries. Of course, it is not feasible to detect such an action with certainty in man, yet some recent text-books state that, in toxic doses at least, digitalis may produce a dangerous constriction of the coronaries, and it has also been argued that when pulsus alternans is produced or aggravated by digitalis the phenomenon is due to coronary constriction. These beliefs have also been responsible for the view that digitalis is contra-indicated in cases with so-called angina pectoris. We are convinced that these ideas are misleading and erroneous: (1) The painstaking animal experiments of Felix Meyer[1] and of Sakai and Saneyoshi[2] and others have shown that the digitalis bodies do not constrict the coronaries of the heart *in situ*. In fact, digitalis seems to dilate them actively while strophanthin increases the coronary blood flow indirectly by elevation of the aortic pressure. (2) The statement that marked coronary constriction may occur in man from toxic doses of digitalis is based upon pure assumption and not upon any satisfactory evidence. (3) The occurrence or aggravation of pulsus alternans occasionally seen in cases of advanced heart-failure under digitalis treatment does not prove that the drug is responsible for the change or that coronary constriction is present. Pulsus alternans may well develop spontaneously in such cases and in spite of the administration of digitalis rather than because of it. When alternans is already present it is strong evidence that the

[1] Ueber die Wirkung verschiedener Arzneimittel auf die Coronargefaesse des lebenden Tieres, Arch. f. Anat. and Phys., phys. Abteil., 1912, 223.

[2] Ueber die Wirkung einiger Herzmittel auf die Koronargefaesse, Arch. exp. Path. and Pharm., 1914–15, lxxviii, 331.

exhaustion of the heart is almost complete, and in such a heart the exhaustion may progress even when digitalis is being used in adequate doses for all forms of treatment frequently fail to check the progress of failure in such late stages of heart disease. (4) Digitalis is often of great value in cases with pulsus alternans and not infrequently restores the normal rhythm, at least temporarily.[1] (5) When the administration of digitalis results in the relief of heart-failure and the restoration of cardiac efficiency it is inconceivable that it should improve the capacity of the heart for work and at the same time reduce and impair its nutrition and internal respiration by a constriction of the coronaries. It is a fact also that anginal pain is usually but a symptom of heart-failure and the control of the failure by the administration of digitalis frequently relieves the pain. In such cases the continued or intermittent use of digitalis, by preventing the recurrence of failure, often also prevents the recurrence of the pain.

The third question upon which some doubt seems to persist is that of the mechanism of the diuretic action of digitalis. While it has been claimed that digitalis exerts a specific diuretic action on the kidneys, or that it produces diuresis by selective vasodilatation of the renal arterioles, the evidence for these claims is quite unsatisfactory, and careful studies have shown conclusively that the drug is not a diuretic in normal animals. It has also been observed repeatedly that no diuresis follows the administration of digitalis to normal human beings or to those with heart-failure uncomplicated with edema or serous effusions. In cases of nephritis with edema, or even with general anasarca, digitalis also produces no diuresis when heart-failure is not associated with the nephritis. When, however, heart-failure is accompanied with edema or anasarca profuse diuresis may follow the administration of digitalis, but this is found to occur only when the heart-failure is more or less effectively overcome by the drug, and when the heart-failure is not affected no diuresis ensues from its administration. It is clear, then, that the diuretic action of digitalis in man is essentially

[1] Windle, J. D.: Clinical Observations on the Effect of Digitalis in Heart Disease with Pulsus Alternans, Quart. Jour. Med., 1916–17, x, 274.

secondary to its capacity to relieve heart-failure and restore the circulation; and when it is effective in edematous cases of heart-failure, it is often one of the earliest of the manifestations of the action of the drug, though other evidences can be detected if looked for. When adequate digitalization fails to produce diuresis in a patient with edema and heart-failure it will almost invariably be found that either the heart-failure has not been relieved or that the failure is complicated by nephritis, which then demands appropriate treatment.

Having reviewed some of the more important therapeutic actions of digitalis, let us now turn to the consideration of certain of the problems connected with its oral administration to man. In approaching these questions we must bear in mind the following points:

1. The indication for the administration of digitalis is determined by the degree of heart-failure, not by the cause of the failure.

2. The dosage and the criteria of the action of digitalis are identical, irrespective of the cause of the heart-failure, although the method of administration may be influenced by the cause of the failure.

3. In the absence of satisfactory therapeutic response one can be certain that digitalis has been given a fair trial only when it has been administered to the point of production of one or more of the criteria of minor intoxication.

The proper administration of digitalis demands the ability to judge the degree of digitalization which is being produced because all of the digitalis bodies can cause serious poisoning and because the nature of heart-failure is such that incomplete recovery or death may result from inadequate treatment. The following are the more important criteria by which the degree of digitalization can be judged:

In cases which respond favorably there is a group of phenomena, both subjective and objective, which indicate more or less effective digitalization and which may be embraced by the term, "Clinical Improvement." These include all such definite evidences of improvement in the circulation as relief or disappearance of the

patient's respiratory symptoms; relief of cardiac or precordial pain; disappearance of the nausea due to splanchnic congestion; the production of diuresis; diminution or disappearance of evidences of congestion of the liver; fall in pulse-rate; decreased degree of irregularity in auricular fibrillation together with reduction in the pulse deficit, or its disappearance.

The number and nature of these phenomena and the extent of their development depend on the conditions existing prior to treatment, on the capacity of the heart to respond to digitalis and on the adequacy of treatment. When well-developed they usually indicate adequate digitalization and the discontinuance of the drug or a reduction in its dose. Their occurrence also corresponds in the majority of cases to the appearance of minor toxic actions of digitalis.

The following phenomena occur independently of a therapeutic response and are not necessarily indicative of a toxic action of digitalis, though each is certain evidence of the absorption and action of the drug: Prolongation of the time of auriculoventricular conduction, which can be detected in graphic records as one of the earliest and most constant effects of digitalis upon the heart; flattening or inversion of the *T* wave of the electrocardiogram, which is nearly as constant as the preceding but does not occur quite so early; the production of sinus arrhythmia or the exaggeration of a preëxisting sinus arrhythmia.

Finally, the following phenomena are indicative of some degree of digitalis intoxication and their appearance demands the cessation of further administration or a sharp reduction in the dose: Nausea or vomiting; marked grade of sinus arrhythmia, especially when phasic in type and independent of respiration; partial or complete heart-block; premature contractions; the "coupled rhythm" due to the regular recurrence of a premature contraction after each regular beat; auriculoventricular dissociation; the *A-V* or nodal rhythm; ventricular tachycardia; other rare disturbances of the cardiac rhythm. Two or more of these phenomena not infrequently occur together in the same patient.

These arrhythmias of digitalis intoxication must be distinguished

from those due to the heart-failure itself. This can frequently be accomplished only as the result of the most careful and constant observation of the patient from the outset, usually with the aid of graphic records, for it is impossible to distinguish without knowledge of the previous condition whether block, premature contractions, etc., are due to digitalis or to the progress of the heart-failure. In cases of advanced heart-failure in which the administration of digitalis must always be carried to the limits of the patient's tolerance when the desired therapeutic effects are not obtained, the knowledge and skill of the clinician are frequently taxed to the limit to determine when to stop the administration of the drug. In all such cases it is best to secure the aid of a specialist, preferably from the beginning, but always before it is too late for his services to be of value.

While it is generally desirable in the treatment of heart-failure to secure the maximal therapeutic effects of digitalis promptly, the urgency of the symptoms and various other factors must determine the rapidity with which digitalization should be induced in any given patient. With this in mind, and in view of the facts already set forth, three general plans of dosage by oral administration are suggested.

Small Dose Method. From four to six days are generally required for digitalization by this method; 0.125 to 0.25 gram (gr. ij to gr. iv) of the powdered leaf or 1.25 to 2.5 c.c. (♏ xx to ♏ xl) of the tincture should be administered every four hours—four doses daily—and continued until digitalization is induced. With weak or poorly absorbed specimens of digitalis full digitalization may not be secured at all by this method or it may require ten days or more to secure it.

Large Dose Method. From one to two days are required for digitalization. During the first twenty-four hours a dose of 0.4 gram (gr. vj to gr. vij) of the powdered leaf or 4 c.c. (dram j) of the tincture should be administered every six hours, day and night, for four doses. On the second day the dose should be reduced one-half and the interval may be shortened to four hours, giving four doses per day and none at night. This latter dose and interval should be continued until full digitalization is secured.

The Body Weight Method. This method permits full digitalization within ten to twenty hours from the beginning of administration and is specially serviceable in cases manifesting urgent symptoms. Its use has proved so satisfactory during the five years that have elapsed since its introduction that it has been possible very largely to do away with the necessity for the intravenous or intramuscular administration of ouabain, strophanthin or other digitalis preparation. It has been described in detail so recently that it is sufficient to refer to some of the published papers in which it is discussed. [1] [2] [3] [4]

Mention of other members of the digitalis group of drugs has been omitted in discussing dosage by oral administration, because digitalis itself is preëminently the drug of choice by reason of its availability, absorbability and persistence of action. Its availability needs no comment, but a few remarks are in place with reference to the choice of preparation. The preparation selected should always be one which has been assayed biologically and proved to be of high activity. It should be remembered, however, that the biologic unit is a more or less arbitrary figure which merely serves to indicate the relative activity of the preparation, as determined by a particular method of assay, and in general it bears no direct relation to the dose of the preparation for man. The cat unit, however, is employed for the calculation of the human dose in the Body Weight method of administration. The figures obtained by different methods of bio-assay are not comparable one with another, but it is generally true that a preparation which is highly active, as shown by one method, will be found active by any other, although the activity of a given specimen may differ considerably by different methods of assay.

The particular official form of digitalis selected will depend largely upon the personal preference of the physician, but we are

[1] Eggleston, Cary: Digitalis Dosage, Arch. Int. Med., 1916, xvi, 1.

[2] White, S. M., and Morris, R. E.: Eggleston Method of Administering Digitalis, Arch. Int. Med., 1918, xxi, 740.

[3] Robinson, G. C.: Rapidity and Persistence of the Action of Digitalis on Hearts showing Auricular Fibrillation, Am. Jour. Med. Sc., 1920, clix, 121.

[4] Eggleston, Cary: Administration of Digitalis by the "Eggleston Method," Jour. Am. Med. Assn., 1920, lxxiv, 733.

convinced that the powdered leaf and the tincture are the most satisfactory. The dose of each is of convenient bulk; each can be assayed biologically and each keeps for long periods of time without material loss of activity. The powdered leaf is especially to be commended because it can be dispensed in capsules, which are easily carried and pleasant to take, and the disagreeable bitter taste of the fluid preparations is avoided. The dose of the fluidextract is too small for convenience, while that of the infusion is unnecessarily large, in view of its unpleasant flavor. Further, the fluidextract is seldom up to standard in activity and the infusion is not assayed. Even when the infusion is prepared from the assayed leaf the activity of different lots is seldom uniform on account of variations in the completeness of extraction of the active constituents.

Of the many proprietary preparations and specialties which are offered with high claims for oral administration none is superior to the powdered leaf or tincture of high grade, and most are decidedly inferior. All are quite costly and the price of some is exorbitant. If one feels impelled to employ one of these, digipuratum or digipoten will be found to be the best, but these are merely carefully assayed, purified preparations from good digitalis leaves.

The materia medica of the digitalis group of drugs is large, but digitalis alone is well absorbed from the alimentary tract of man. Strophanthus, convallaria, squill, etc., are both poorly and irregularly absorbed. Strophanthus deserves special mention, because it is 100 times as active as digitalis, yet the official dose is only half that of digitalis, and it is often given in equal doses. The irregularity of its absorption is of greater importance than the fact that its absorption is generally poor, for in some cases serious poisoning has resulted from the rapid absorption of the customary dose.[1] We are convinced that strophanthus should never be used for oral administration to man on account of the danger of serious accident, despite the fact that it often has been so used with satisfactory results.

The subjects of absorption, persistence of action and elimination

[1] Hatcher, R. A., and Bailey, H. C.: Clinical Use of Strophanthus, Jour. Am. Med. Assn., 1910, lv, 1697.

of digitalis are so closely related that we will discuss them together in the closing section of this discourse. While digitalis is generally well-absorbed from the human alimentary canal, several instances have come to our attention in which absorption was very unsatisfactory.[1] In some instances the poor absorption is unquestionably due to some individual peculiarity on the part of the patient or to some factor in his condition. In others, however, the fault seems to lie with the digitalis, and my colleague, Dr. Robert A. Hatcher, has been able to throw some light on this matter. His work has not yet been published and is still incomplete, but the following observations seem highly significant: Digitalis can be readily separated into two fractions by extraction of its aqueous solution with chloroform. The chloroform-soluble fraction is readily absorbed from the alimentary tract of the cat, while the chloroform insoluble fraction is poorly and irregularly absorbed. Both fractions are active when injected intravenously, manifesting the typical actions of digitalis. The two fractions vary widely in the relative proportions in which they are present in different samples of digitalis, and at least one of the samples of digitalis which showed very poor absorption in man contained relatively very little of the chloroform-soluble, absorbable fraction.

Dr. Hatcher has supplied me with solutions of these two fractions, of equal activity by the cat test, and these have been administered to a number of patients to observe their absorption. These observations, too, are incomplete, but they have shown quite definitely that the chloroform-soluble fraction is well absorbed from the human alimentary tract, while the chloroform-insoluble fraction is absorbed poorly. Comparing the amounts required to produce minor intoxication or full therapeutic effects, nearly four times as much of the chloroform-insoluble fraction as of the chloroform-soluble is required to produce similar effects. This is true even when the two fractions are given on different occasions to the same patient. The rate of absorption of the chloroform-soluble fraction seems to be quite equal to that of the best digitalis,

[1] Wedd, A. M.: Observations on the Clinical Pharmacology of Digitalis, Bull. Johns Hopkins Hosp., 1919, xxx, 131.

but we do not yet know that it is any more rapid. The results of these observations will be reported in detail at a later time.[1]

It has been shown that digitalis of high grade is generally well absorbed from the digestive tract of man, and it seems apparent that the absorption of a single dose is completed within six hours. Recently, Pardee (unpublished) has shown that there is definite electrocardiographic evidence of considerable absorption in from two to four hours, and the observations of Levy (unpublished) and of Robinson[2] confirm this. These observations are quite at variance with the rather general belief that digitalis is slowly absorbed. That belief seems to have been based on the older mistaken idea that from three to six days were always required to secure digitalization in man, which, in turn, arose from the administration of single doses which were too small. We know how that digitalis is fairly rapidly absorbed and that full digitalization can be secured by oral administration certainly within twenty-four hours after the first dose, and frequently within ten hours.

Through the work of Hatcher[3] on animals and of Eggleston,[4] Cohn and his associates, Robinson and others, on man it has been proved that the action of digitalis on the human heart may persist for periods up to two weeks or longer after administration has been stopped. This persistence of action is one of the valuable features of digitalis as a cardiac remedy and its recognition is of considerable therapeutic importance. In the first place it accounts for the phenomenon previously called "cumulation," and always somewhat shrouded in mystery. Taken together with the knowledge of the rate of absorption of digitalis, and of its average dose for man, it demonstrates the fact that it is quite unnecessary to administer digitalis at the short intervals customarily observed. It is never necessary to administer a dose more often than every four hours,

[1] Since this was written two preliminary papers have appeared on this work: Hatcher, Robert A.: Some Observation on the Pharmacology of a Digitalis Body, Jour. Am. Med. Assn., 1920, lxxv, 460. Eggleston, Cary: The Absorption of a Digitalis Body, Jour. Am. Med. Assn., lxxv, 463.

[2] Loc. cit.

[3] Persistence of the Action of the Digitalins, Arch. Int. Med., 1912, x, 268.

[4] Clinical Observations on the Duration of Digitalis Action, Jour. Am. Med. Assn., 1912, lix, 1352.

and a six-hour interval is generally preferable. Further, when a patient is to be kept upon the continuous administration of a small dose of digitalis this need be taken only once daily instead of being divided into two or three doses. Finally, the persistence of action must always be kept in mind when one considers the administration of ouabain (crystalline strophanthin) or amorphous strophanthin intravenously or intramuscularly, for the doses of the latter are commonly large, in terms of activity, and serious or fatal poisoning has occurred from such injections in patients who have recently been receiving digitalis.

The mechanism of this persistent action is not definitely understood, but the evidence seems to indicate that it is due to the firm fixation of a small amount of the drug in the tissues of the heart where it continues to exert its actions. One of the strongest reasons for believing this to be the case is the fact that digitalis disappears from the blood stream very rapidly after intravenous injection in a variety of animals. Some earlier pharmacologic experiments also seem to indicate that the heart is capable of storing minute quantities of the digitalis bodies.

Very recently Pardee[1] has studied the rate of the elimination of digitalis in man by administering the drug orally until a definite effect was produced and determining the dose required. After a lapse of an interval during which no digitalis was administered the same preparation was again given and the amount determined which was required to reinduce the effect previously produced. In this way, using a single sample of tincture of digitalis, he determined that the rate of elimination amounted to about twenty-two minims per day. This figure, of course, applies only to the particular specimen of digitalis with which he worked, but it is significant and agrees with the general impression that from 1.5 to 2 grains of digitalis (15 to 20 minims of the tincture) can generally be administered over long periods of time to prevent the recurrence of heart-failure, and without producing intoxication.

Finally, in closing, let me refer briefly to the investigations of

[1] Notes on Digitalis Medication, Jour. Am. Med. Assn., 1919, lxxiii, 1822.

Hatcher and Eggleston[1] on the elimination of certain digitalis bodies from the animal organism, since they throw some light on the mechanism by which elimination is accomplished. Their investigations show that in animals at least both the liver and the kidneys participate. The liver seems to be capable of rapidly fixing, and probably also of destroying or decomposing, a large proportion of ouabain after its entrance into the blood stream. Other tissues in the body also apparently can fix rapidly and thereby remove from the blood stream large amounts of ouabain, but the liver seems to be the organ chiefly concerned in the elimination. The part played by the kidneys is normally relatively insignificant. Whether or not these are the mechanisms involved in man is not known, and at the present time there seems to be no method of attacking the problem in the human being.

DISCUSSION

Dr. Thomas McCrae: I am sure we have all listened with great pleasure to this very clear statement of our knowledge regarding the action of digitalis. One point I think must impress us is that, despite the large amount of work which has been done, there are still so many points which as yet are obscure. I was very glad to hear Dr. Eggleston bring out certain points in reference to supposed contra-indications to the use of digitalis. Aortic insufficiency and high blood-pressure are not in themselves contra-indications. Another point deserves comment, that is the use of digitalis in angina pectoris. When the condition of the heart muscle demands digitalis it should be given, angina pectoris existing or not. Many cases of angina pectoris are due to conditions in the first part of the arch of the aorta. So many men hold to the view that angina pectoris is a strong contra-indication that I think that point should be emphasized. There is another point which grows out of Dr. Eggleston's paper, the question of the dosage, and that after all is the point we have to consider. Should we give digitalis until we have toxic effects or not? There is no question of the value of Dr. Eggleston's work in pointing out the need of prompt action of digitalis in serious

[1] Studies in the Elimination of Certain of the Digitalis Bodies from the Animal Organism, Jour. Pharm. and Exp. Therap., 1919, xii, 405.

cases. Should that be applied generally? Should we consider that it is necessary to bring a patient as rapidly as possible under digitalis and produce toxic effects, leaving out certain cases in which the condition is acute? Taking the general run of patients that demand digitalis my feeling is that this is not necessary. As Dr. Eggleston pointed out, many of these cases of toxic action of digitalis demand very skilful observation and often instrumental observation, which for the majority of the profession is not possible. I question whether the emphasis placed on giving large doses of digitalis has not resulted in doing more harm than good. I have seen this in pneumonia more than under any other circumstances, owing to the view having got abroad that digitalis should be given in very large doses. I hope I make myself clear. I believe this method of rapid digitalization is of great value in certain, but I believe few, cases, and that in the majority of cases as seen by the practitioner the patient is very much safer if the more conservative method is adopted. What after all grows out of this problem especially is the question of the dosage, of giving digitais in our everyday work.

Dr. Hobart A. Hare: I, too, have listened with a great deal of interest to the paper by Dr. Eggleston, and he will not take it amiss if I have listened with even more interest to my colleague, Dr. McCrae, because while teaching in the same school it is the first time an opportunity such as this has really offered to compare our views. There is danger of two teachers of similar lines teaching differently. The first point I wish to discuss, one of the points touched by Eggleston, is that digitalis does not raise blood-pressure. Now if I may be pardoned for saying so, this is an illustration in which pharmacological observation on animals and on normal men is given a factitious importance in connection with the employment of the drug in abnormal men. As soon as one looks at the action of other drugs you see at once the point that I mean. A man is taken in health and given digitalis in any dose that may be chosen, the sphygmomanometer fails to reveal that there is any rise in blood-pressure. The man who makes the experiment makes the announcement *ex cathedra* that it does not raise blood-pressure. Of course it does not in normal man. Neither does antipyrin affect the body heat when the temperature is normal. If somebody would say he had given 10 grains of antipyrin to a man whose temperature was normal and it did not reduce the temperature, therefore the antipyrin was not an antipyretic drug in its influence, we would not regard his statement with much respect. The fact is that digitalis does raise blood-pressure when it is low. The statement made by Dr. Eggleston, quoted from Magnus and others, that digitalis greatly increases the output of blood

into the vessels in a given time by increasing volume with each propulsion indicates this fact. There is another point to be considered. Let us suppose we have a case of disease in which there is circulatory failure due to some cardiac difficulty. I can conceive that it is perfectly possible for accurate clinical observation to result in the observation that the patient's blood-pressure is not raised, but actually lowered, for by restoring circulatory equilibrium a more normal state of blood-pressure is established. When a man is somewhat cyanotic or before he has gotten to an advanced stage of cyanosis there is an accumulation of CO_2 in his blood and that tends to raise blood-pressure, but as soon as the right heart drives blood through the heart normally and the man's respirations quiet down, his pressure may fall because he is not laboring so hard. The digitalis relieves the man of stress and strain and lowers blood-pressure. If you or I go to the first floor of this building and run upstairs four or five times we raise our blood-pressure. So if a man is suffering from pneumonia and a failing heart, and breathing forty times instead of sixteen, he is working just as hard as you or I do when running upstairs. You give him digitalis, support his heart and blood-pressure falls; it does not rise. The heart is supported and the man is not laboring breathing forty times a minute, as after physical exercise has been taken. So it does not do to say that the well-defined positive idea in the minds of the profession that digitalis under certain circumstances, but not under all, raises blood-pressure is fictitious. There is too much tendency among pharmacologists to make investigations in regard to drugs and say we are all wrong. For many years we were taught that alcohol was a stimulant. Now we are taught correctly that it is a depressant. We thought that alcohol did good by acting as a stimulant. Our explanation of how it acted was wrong but our observation that it did good was correct. There is nothing more dangerous in methods of research than an authoritative *ex cathedra* pronouncement, which turns upside down preconceived notions of many thousands of practitioners and leaves them in doubt as to whether they and their colleagues are right or wrong. There was one point which Dr. Eggleston mentioned of vital importance, and also touched upon by Dr. McCrae, and that is the matter of full doses of digitalis, or any doses of digitalis, namely, that it should not be pushed unless controlled by the electrocardiogram or polycardiograph.

Dr. Cary Eggleston (closing): I should like to correct an impression which apparently I have made and I desire to make one reference to the dosage of digitalis. I quite agree with the remarks Dr. McCrae made that such a large dose as I have advocated is by no means necessary in the vast majority of cases of heart-failure, but the point I wish to

emphasize is that in general in the past we have had a tendency to give too little. I think we can strike a happy medium between the administration of too little and the very rapid administration. I do not think in urgent cases there is any such thing as too rapid digitalization. I do not think in the mild cases of failure there is need for anything other than relatively slow digitalization. With reference to Dr. Hare's remarks upon the blood-pressure, I merely was trying to indicate the fact that the existence of a high blood-pressure does not constitute a contra-indication to the use of digitalis. It may elevate an abnormally low pressure, or may depress an abnormally high blood-pressure. The pharmacologists are guilty of having committed an error in showing that digitalis is capable of acting as a vasoconstrictor. Their observation was correct; their error was that they did not interpret it for the clinician. While digitalis is capable of exerting such an action, there is no evidence that it constricts the bloodvessels directly in man, and I do not believe that we have any reason to anticipate dangerous results from the administration of digitalis in the presence of high blood-pressure, be that due to cyanosis or be it an accompaniment of a general arteriosclerosis. If the heart is failing we should not hesitate; if it is not, we have no business to administer digitalis.

PRINCIPLES OF THERAPY IN HUMAN HYPERSENSITIVENESS.

By ROBERT A. COOKE, M.D.

(From the Department of Bacteriology and Immunology of Cornell University and the New York Hospital, First Medical Division.)

As a part of your Symposium on Recent Advances and Departures in Therapeutics, I wish to invite your attention this evening to a special field of medicine that can be classified as a branch of immunology. It will be necessary for me to preface my remarks on the therapeutics of applied immunology with a condensed statement of the position taken on some of the fundamental theoretical problems as well as methods of diagnosis. In doing this I am compelled to be rather too didactic for scientific accuracy but the proper conception of these fundamentals will greatly aid you in appreciating the whys and wherefores of specific therapeusis in the group of conditions under consideration.

Under the general title of *hypersensitiveness* we group those reactions occurring in man and in the lower animals that are characterized by specific symptoms to specific substances which are of themselves devoid of reaction in the normal of the species.

Included in this group we recognize at once the phenomenon of anaphylaxis as seen in the experimental animal, because here we have specific symptoms to specific substances called antigens to which the animal has been sensitized. The important phenomena of anaphylaxis I shall list briefly in order to contrast them with

[1] Read April 7, 1920.

another form of hypersensitiveness which we see in man and to which we now apply the term *allergy*.

I. Anaphylaxis is always artificially induced by the preliminary injection of a minute sensitizing dose of a substance which, when reinjected after a lapse of from five to ten days, produces anaphylactic shock with death in the experimental animal. The important point to bear in mind here is that the phenomenon is always artificially produced by an immunological process.

II. The antigenic substance known in anaphylaxis as anaphylactogen must be protein in nature.

III. The reaction in the experimental animal to the anaphylactogen depends upon the formation of antibodies that are specific to this antigen. These antibodies can be demonstrated as attached to certain cells, for example the smooth muscle fiber of bronchi and uterus. They also exist in a free form circulating in the blood and can be demonstrated by means of precipitin reactions, by complement fixation and agglutination, and more important still, by passive transfer.

IV. Anaphylactic hypersensitiveness is never inherited. By this I mean that the hypersensitive male guinea-pig can never transmit to his offspring a direct hypersensitive state or a tendency to such a state.

V. Desensitization of the hypersensitive or anaphylactic animal can be accomplished by the sublethal injection of the specific antigen, after which time the specific antigen can be given in large quantities without the manifestation of any anaphylactic symptoms.

VI. Anaphylaxis in the animal is not permanent. The hypersensitive rabbit loses its reaction in three weeks. The exception to this rule is the guinea-pig, in which the reaction is permanent for three years, which is the natural span of life for the animal.

VII. With regard to the degree of hypersensitiveness that is created artificially, it can be stated that a 250-gram guinea-pig has been rendered anaphylactic with as small a quantity as 0.000001 cubic centimeter of serum or 0.000005 gram of crystalline egg albumin. The intoxicating dose of antigen varies from 0.1 to 0.01 cubic centimeter of serum when administered intravenously.

As opposed to this picture of the phenomena of anaphylaxis, I shall present that of hypersensitiveness as seen clinically in the human.

I. It is never and can never be artificially induced at will. By this I do not mean to infer that anaphylaxis as such cannot be induced in the human for the phenomena of this condition bear no relation to the clinical reactions that we see. Many instances are on record today of the fact that an individual reacts to certain substances the first time they are administered. This is best observed in the history of children or infants in which the first administration of egg or cows' milk induced violent manifestations of acute gastro-enteritis, asthma, or urticaria. On the other hand, we find that those individuals who have been given foreign proteins in the form of therapeutic sera do not react with characteristic symptoms in any such way as those who are *naturally* hypersensitive.

II. Hypersensitiveness in the human is in no sense restricted to protein, for, as you will see later, we have reactions occurring in the human to such non-protein substances as glue, iodoform, arsenic, aspirin, to mention a few of the many non-protein substances that have been met with.

III. Antibodies are not a demonstrable phenomenon. To be sure, antibodies can be demonstrated for a short time in the blood stream of humans who have received enormous doses of foreign serum; but they are not demonstrable in the blood stream of those cases of clinical hypersensitiveness even though this hypersensitiveness exists to true protein substances such as ovomucoid and casein and in spite of the fact that these individuals were receiving subcutaneous injections of these substances at the time. To those substances that are non-protein in nature, antibodies, as we know them today, cannot be formed either in man or in the experimental animal.

IV. A very important phase of natural human hypersensitiveness is its dependence upon certain inherited traits or capacities. In a former paper with Dr. Vander Veer, the writer demonstrated, among others, the following few facts with regard to inheritance:

(*a*) Of 504 cases of hypersensitiveness there was a positive antecedent history of hypersensitiveness in 48 per cent. Whereas, in another group of apparently normal individuals the antecedent history showed hypersensitiveness in only 14 per cent.

(*b*) In those cases in which there was an inheritance of allergy on both sides the age of onset curve reached its maximum before the fifth year. Whereas in those cases in which the inheritance was unilateral the age of onset curve reached its maximum between the tenth and fifteenth years. In those cases in which no family history could be elicited and in which therefore, presumably, it was more distant, the maximum of onset did not reach its height until the twentieth to the twenty-fifth year.

(*c*) As to the nature of the inheritance it has been shown that the individual does not inherit a specific sensitization, since the offspring are not born sensitive, twins do not show the same clinical form of hypersensitiveness and the reaction in the descendant is more frequently different from than identical with that of the antecedent. The individual inherits a tendency or capacity for peculiar cellular activities and the factor that determines what form these activities shall take is not even surmised.

V. Desensitization in anything like the complete form that has been attained in anaphylaxis is utterly impossible in cases of clinical human hypersensitiveness. To be sure there is in a sense in the human a partial desensitization, better expressed as "clinical insensitiveness," as the result of subcutaneous injections of a specific reacting substance. But even in those cases in which, as the result of an overdose, constitutional reactions with asthma, urticaria or coryza have been induced, a similar injection on the same or the following day will produce similar phenomena of the same or even a greater degree of severity.

VI. In general the natural clinical human hypersensitiveness is a permanent condition. While a few instances of spontaneous cures have been recorded in hay fever and horse asthma, it is safe to assert that these are the extreme exception and that a person once hypersensitive to animal emanations is always hypersensitive. The exception to this is the reaction to foods occurring in infants.

The majority of these cases lose their reaction before they reach adult life.

VII. While we can marvel at the delicacy of the reaction artificially induced in animals, it is nothing in comparison with the exquisite degree of hypersensitiveness frequently met with in man. One milligram of nitrogen in the form of serum is required to kill a guinea-pig weighing one-fourth of a kilo when administered intravenously, whereas 0.0025 milligram has produced violent constitutional reaction when administered subcutaneously in a hypersensitive man weighing 70 kilos or two hundred and eighty times the weight of the guinea-pig. If this injection in the man had been given intravenously it would, without question, have produced death. In other words, the degree of hypersensitiveness in this case was nearly six hundred thousand times as great as any that has ever been artificially produced in an animal.

So you now see that we have under the general classification of hypersensitiveness two distinct groups which have been differentiated. First, an anaphylaxis artificially induced in animals to protein substances only, and secondly, allergy or human hypersensitiveness, a natural or spontaneous phenomenon occurring with protein or non-protein substances. There are only two points of similarity. (1) In man as well as in the animal the reaction is undoubtedly cellular and (2) there is a clinical similarity between the anaphylactic reaction in the guinea-pig, shown by manifestations that can be called asthma, and bronchial asthma in man, which is merely one of the clinical manifestations of human allergy. I do not believe we can overestimate the importance of this distinction of the two conditions so generally confused. We see so constantly in medical literature, attempts to explain all phenomena of human allergy on the basis of the preconceived ideas of what might be expected from studies in anaphylaxis, whereas it must be evident to anyone who has worked thoughtfully in this field that the phenomena accompanying the two conditions are fundamentally distinct.

Symptoms of Allergy. We shall now devote ourselves entirely to a consideration of allergy, and first of all to the symptoms.

These are exceedingly varied and include a number of seemingly unrelated clinical entities.

The tissues that are involved in the reaction are those of epiblastic origin, particularly the skin and the mucous membranes of the respiratory and gastro-intestinal tracts. The symptoms that are produced are the result of congestion, edema, and secretory activity in the tissues affected. The hypersensitive area may be restricted to a small circumscribed space, such as the mucous membrane of the nose or of the stomach or of the bronchi, or even of a small portion of the skin. Or it may be widespread and include all of these tissues at one and the same time. To be more specific, the clinical complexes known to be allergic are allergic coryza (hay fever), bronchial asthma, acute gastro-enteritis, functional hyperacidity, intestinal angioneurotic edema, and certain forms of dermatitis. The reaction may be immediate, that is, it may occur from one minute to one hour after the introduction of the allergen or it may be delayed for twenty-four hours. For example, an individual who gives a perfectly typical clinical history of hay fever occurring in August and September and perfectly free at all other times of the year, immediately upon contact with the pollen of ragweed develops a most acute form of coryza. These immediate reactions are more readily diagnosed than the delayed reactions. As an instance of a delayed reaction there is the history of a woman who had suffered with urticaria and angioneurotic edema for six months. It developed in her history that during this time she had made a habit of eating a rather unusual amount of chocolate at luncheon each day in order to put on weight. It was discovered by skin test, of which I shall speak later, and clinical experiment as well, that chocolate was the only etiological factor in the production of her symptoms. After abstaining from this article for a week, during which time no manifestations developed, she was allowed to eat the usual amount of chocolate at a certain time. Urticaria and angioneurotic edema developed, not immediately, but at the end of twenty-six hours, and this reaction time was identical in three separate tests.

Another manifestation of this delayed reaction is seen in what we

call serum sickness, where urticaria develops from five to seven days after the introduction of such a foreign substance as horse serum, given for therapeutic measures. The discovery of the cause and its relation to the effect in these cases of delayed reaction is one of the most difficult problems with which we have to deal today in human allergy.

I have stated that the pathological conditions are congestion, edema and secretory activity. In addition there is an irritation of the sensory nerve ends, giving rise to the symptom, pruritus. You will therefore see why, when the hypersensitive area is limited to the mucous membrane of the nose, the reaction that ensues in the presence of the specific allergen gives rise to those manifestations which we call hay fever. Where the hypersensitive area is limited to the bronchial mucous membrane the congestion and edema of this membrane create an interference with the free entrance and exit of air and we have the clinical picture of bronchial asthma. Where the hypersensitive area is limited to the skin, the reaction that occurs when the hypersensitive tissues are brought in contact with the specific allergen manifests itself in several forms, the reason for which we do not yet know, but it produces the clinical condition of either urticaria, erythema, or angioneurotic edema. When the cells that are hypersensitive to a specific allergen are diffuse and include the nasal mucous membrane, bronchial mucous membrane, intestinal mucous membrane, and skin, we have the clinical picture of disturbance in all these areas.

Let us now proceed to a consideration of the substances to which hypersensitiveness exists. From what has been previously said, you will see that we must discard the term *protein reaction* as entirely too restricted, and we must recognize the fact that any chemical element or compound in soluble form is a possible cause for an allergic reaction in some individual. To be sure, there are substances that are much more commonly met with than others and it has been possible in a general way and for purely clinical reasons to group these according to the usual channels of observation.

I. By Inhalation. (*a*) *Animal Substances.* So far as we can see this is essentially limited to the dander, that is the epithelial cells that are desquamated from any animal. Those most commonly met with are the domestic animals, such as the dog, cat, horse, bird, rabbit, guinea-pig, and they are very commonly met with as reactions to the goose, duck and chicken where the feathers of these animals are used in pillows.

(*b*) *Vegetable Substances.* These include the pollens particularly and portions of the leaves, stem, roots and seeds of various plants. The most important member of this group is the powdered root of orris, because it is used so extensively commercially in tooth powder and sachet.

This group of substances absorbed by inhalation is by far the most important in the causation of those forms of human allergy diagnosed as hay fever, vasomotor rhinitis and bronchial asthma. As a matter of fact they are the demonstrable cause in 62 per cent. of all cases of asthma and in 80 per cent. of all cases of allergic coryza, both hay fever and vasomotor rhinitis. It might be wise to mention here that our present conception of vasomotor rhinitis is that it is an allergic reaction, identical with hay fever but not seasonal in character on account of the fact that there is a more or less continuous exposure to the exciting cause and that therefore the symptoms are practically continuous.

II. By Ingestion. Here we have a group of reactions occurring from substances artificially taken as (1) foods or condiments and (2) drugs. This group accounts for about 10 per cent. of the cases of asthma and about 80 per cent. of the cases of urticaria, angioneurotic edema and intestinal manifestations.

Among the foods most commonly met with as allergens are milk, egg, fish (not the muscle of fish but the collagen which is contained in fish glue as well), strawberry, pineapple, melon, lima bean, navy bean, green pea, corn, celery, spinach, wheat, rice, rye and oats.

A word here should be said with regard to drugs. Drug idiosyncrasy so-called is nothing more or less than drug allergy. The reaction that occurs in hypersensitive individuals is char-

acterized by the very same phenomena of allergy that we have already described and bears no relation whatsoever to the usual pharmacological action of the drug. No matter how large a dose of quinin is administered to the normal individual, it will never create in him a subcutaneous edema or an attack of bronchial asthma. No matter how large a dose of aspirin we give to the normal individual, we can never produce these same phenomena. The writer has already reported twelve examples of aspirin hypersensitiveness in which the reaction followed within twenty minutes of the ingestion of five grains by mouth. In one case death ensued from the asphyxia by bronchial edema. In another case there was an almost fatal result in which the life of the patient was saved by prolonged artificial respiration.

The drugs most commonly met with that are responsible for these typical allergic phenomena are quinin, aspirin, coal-tar products and morphin. In some instances the drug reaction manifests itself more particularly upon the skin, and in some instances upon the heart, causing prostration and collapse. My own experience with these drug reactions has led me to be extremely cautious and to warn others against the administration of drugs to which the patient himself objects, for this is sometimes done on the supposition that the patient is purely neurasthenic.

III. By Absorption from Infective Focus. That bacterial proteins or toxins can be absorbed from an infective focus and act as allergens in the strict sense of the word is a matter of great question today. The importance of associated infections, however, in many cases of hypersensitiveness is a thing about which there is no doubt and has a very important clinical and therapeutic significance. In practically all of the chronic allergic reactions in the nasal and bronchial mucous membrane there is a secondary infection which plays an important role and this will be considered under Therapy.

IV. By Subcutaneous or Intravenous Injection. Therapeutic sera or drugs are very commonly admitted today by both of these routes. If an individual should be hypersensitive to any of the substances so given a serious or even fatal result would

immediately take place. It is always necessary therefore either to make a cutaneous diagnostic test or in the case of drugs resort to preliminary medication by mouth in order to make sure of the fact that the patient is not hypersensitive.

In general then it can be stated that those substances absorbed by inhalation usually give rise to symptoms in the upper respiratory tract. Those substances absorbed by ingestion usually give rise to symptoms referable to the mouth, esophagus, stomach, intestine or skin. The determining factor in the localization of the reaction is not known. There is no explanation for the fact that one case will have hay fever alone, while a second will have hay fever with asthma from the same pollen, and a third will have asthma alone or with a minimum of hay fever. Further, in practically all of these cases where the clinical symptoms are manifested strictly locally in the nose or in the bronchi, there is at the same time an associated hypersensitiveness in the epithelial cells which does not show itself clinically in asthma or hay fever, as the case may be, or by urticaria, or erythema, or angioneurotic edema, because the allergen is never absorbed into the blood stream and never reaches these reacting cells. But this phenomenon is of the utmost importance, for it is made use of in the diagnostic tests now to be described.

Diagnostic Tests. *Cutaneous.* The cutaneous tests are made by the introduction of solutions of such substances as pollens, vegetable powders, animal emanations and foods or drugs into the most superficial layers of the skin by means of a fine hypodermic needle, or solutions of such substances or powders of the same can be applied to small abrasions of the skin. The reactions are positive or negative.

The positive reactions vary in their intensity, depending upon the degree of hypersensitiveness of the individual and are clinically classified as marked, moderate or slight. The marked reactions show within a very few minutes an urticarial wheal which rapidly increases in size and spreads into the surrounding tissue by means of peculiar pseudo-pod projections. Outside of the wheal there is a distinct zone of hyperemia. The moderate

reactions show a hyperemic zone and a wheal which increases considerably in size but lacks the pseudo-pod projections. The slight reactions also have a zone of hyperemia with very little increase in the size of the wheal. In negative reactions there is no hyperemia and no development of a wheal.

Ophthalmic tests are also made, especially in cases of coryza and asthma, in order to confirm the findings by the cutaneous method. A drop or two of a solution of the substance to be tested is placed on the caruncula, or conjunctival mucous membrane. Positive reactions are characterized by itching and lacrimation with congestion of the conjunctival and corneal membranes. They are designated as marked when the entire cornea is congested, moderate where half of it is congested and slight where there is only a congestion in a single quadrant.

From the standpoint of general diagnosis the cutaneous tests are much the more important. From fifteen to thirty of these tests may be made at one time. In the more obscure cases where from one hundred to one hundred and fifty solutions have to be tried, the study of the case will occupy several days. For the interpretation of the reactions this much can be said: That for all cases with a typical history of hay fever of the vernal or autumnal type, the cutaneous tests supported by the ophthalmic reactions are reliable and satisfactory indices in over 95 per cent. of the cases. In bronchial asthma it is possible to diagnose approximately 80 per cent. of the cases by means of the cutaneous reaction, whereas in urticaria, angioneurotic edema, and the other skin manifestations, not more than 50 per cent. can be so diagnosticated today. Further, we find positive cutaneous reactions, especially to the foods, in individuals who can eat these foods without any evident clinical reaction whatsoever. Such cases are not rare and we explain this apparent paradox by the assumption that these foods as such, in the process of digestion are so completely altered that they never reach the cutaneous reacting cells. This being the case then we must assume that in those individuals who have a cutaneous reaction for a certain food substance and yet who, on the ingestion of this article, show a

clinical reaction such as an urticaria, there is some additional factor that permits the absorption of the unaltered substance through the intestinal mucous membrane in order to produce the reaction. What this factor is we do not attempt to explain today.

One further fact is important with regard to cutaneous reactions in general, and that is, that the drugs as a class do not give cutaneous reactions unless an urticaria is one of the clinical manifestations of the ingestion of the drug itself.

On account of the fact that there has arisen so much misunderstanding in the interpretation of the cutaneous tests, it has seemed wise to stipulate two postulates which if they are fulfilled in every case that is studied will make the diagnosis definite and distinct.

I. Hypersensitiveness must be demonstrated either (*a*) by a positive local reaction, cutaneous or ophthalmic or (*b*) the original allergic manifestation must be artificially reproduced at will on the introduction of the substance, either inhaled, ingested, or subcutaneously injected.

II. It must be shown that the individual comes in contact in some way with the suspected substance in order to permit it to act as an etiological factor.

I have dwelt thus at length on these preliminaries because they are the foundation or cornerstone, as it were, of the therapy. Let me emphasize here that therapy, wherever resorted to, must be specific. Specificity is the basis of all our conception of these conditions today and a critical analysis of our cases shows that no satisfactory result has ever been obtained by any form of non-specific therapy.

Therapeutics of Allergic Coryza and Bronchial Asthma. These two clinical conditions can be considered together because they are caused by more or less the same types of substances and the methods of treatment are clinically identical.

Asthma or hay fever occurring in the spring, from the middle of May to the middle of July, are caused in practically all cases by the pollen of grasses. The autumnal form of hay fever and asthma is due to the pollen of ragweed in such a large percentage

of cases, from 90 to 95 per cent., that the other forms of pollen occurring at this time need be considered only as exceptional instances. Unless an individual can move from the locality where these pollens exist, treatment is indicated. On account of the fact that the vernal grasses exist over all the continents and that an individual is free only when he is on the ocean, treatment is practically always necessitated in the cases of early hay fever and asthma of any degree of severity. Those cases that react to the pollen of ragweed can obtain freedom in Europe, in Florida and California and parts of northern Canada. But unless they can move to some such locality they should be treated also.

In order to treat these cases satisfactorily we first determine not only the fact that they react to grass pollen or ragweed respectively, but additional tests are made with varying strengths of the pollen extract in order to estimate the degree of hypersensitiveness. Patients who show a marked reaction to the extract containing 0.01 mg. of nitrogen to the cubic centimeter are exquisitely sensitive and must be given very small doses in comparison with those individuals who only show marked reaction with a solution containing 0.05 to 0.1 mg. of nitrogen to the cubic centimeter.

Where this can be done, these patients are treated prophylactically, that is, injections are begun six to eight weeks before the onset of the attack and they are given injections of gradually increasing strength at weekly intervals until within two or three weeks of the end of the season. In other words, in prophylactic treatment, from twelve to fifteen injections are given at weekly intervals. Those cases that are not so treated may obtain very beneficial effects, even though the attack has started, by injections given daily for three or four days, then at intervals of two, three and four days, gradually increasing the intervals and at the same time increasing the quantities until the end of the season. In these cases of phylactic treatment the number of injections given is usually twelve to fifteen.

Now as to the results that are obtained in these cases. The

writer compared a small series of 135 cases of hay fever and asthma and tabulated the results for each condition as follows:

	Asthma Per Cent.	Hay Fever Per Cent.
Not improved	5	4
Slightly improved	6	5
Improved	36	85
Free	53	6

This is interesting as showing that the asthma is absolutely controlled more readily than the hay fever, but in general we can state that in at least 80 per cent. of cases, more than 80 per cent. of the trouble is removed by treatment, whether prophylactic or phylactic.

Asthma and Allergic Coryza from Vegetable Powders. This is found more particularly in the sachets and toilet powders commonly used. The symptoms are identical with those of pollen except that there is no seasonal variation, the attack depending entirely upon exposure to the irritant. When it is in use by the individual or some member of the family the disturbance resulting from it is chronic. In these cases the diagnosis is sufficient and treatment consists in removal of the irritant. Treatment by injections, as in the pollens is not indicated except in those exceptional cases where the individual is so unfortunately situated that conditions cannot be controlled. Where treatment must be given the same principles hold as already described for the pollens, beginning with minute doses and gradually increasing the strength until a very high degree of resistance is obtained. The difficulty with these cases is that this resistance is not persistent but can be maintained by injections given at intervals of one or two months over a long period of time.

Asthma and Allergic Coryza from Animal Danders. The same principles hold here as with the sachets. The diagnosis should be sufficient and treatment is only indicated where proper environment cannot be secured.

Asthma and Allergic Coryza from Foods. These conditions are not particularly common except in children. They comprised only about 2 per cent. of our entire series. In such instances, it

is better to avoid the articles of diet to which the individual is hypersensitive. Occasionally in children this cannot be done where the individual reacts to many of the important articles, such as eggs, milk and cereals. In such an instance, treatment by injection is indicated, taking one article of diet at a time and producing a degree of resistance sufficient to enable the patient to eat this article without producing a clinica reaction. It is then wise to advise that this particular foodstuff be used daily in certain specified quantities in order to maintain this degree of resistance until such time as nature has caused the reaction to be outgrown. You will remember that under the discussion of foods, earlier in this paper, it was stated that these reactions in children, as a rule, disappear by about the age of puberty.

Asthma and Allergic Coryza from Drugs. Here the diagnosis is sufficient and avoidance of these drugs is absolutely essential.

Asthma and Allergic Coryza from Bacterial Proteins. All cases of chronic allergic coryza and asthma have an associated bacterial infection which is best treated by the use of autogenous vaccines, and this irrespective of the fact that they do not show typical cutaneous reactions to a solution of the protein itself.

The other forms of hypersensitiveness, such as urticaria, angioneurotic edema, erythema, eczema and the gastro-intestinal manifestations, are, as I have said, diagnosticated in only about 50 per cent. of the cases and practically all of this fifty are due to ingested articles, either foods or drugs. The diagnosis is a sufficient indication of the therapy which is merely an avoidance of the reacting factor.

It wil be evident at once that in this therapy there is, with the exception of food reactions in children, nothing whatsoever in the nature of a cure. A result satisfactory to the patient is obtained by avoiding the source of trouble, but in no way can we today produce any permanent resistance or desensitization at will, for there is an inherited constitutional characteristic that, as yet, Nature alone knows how to cure.

To sum up, then, the important points to carry away with you this evening are these four: (1) That animal anaphylaxis is not

identical with human hypersensitiveness or allergy; (2) that in our thoughts of human hypersensitiveness we must discard the conception of a protein reaction as too restricted, for human allergy can and does exist toward many non-protein substances, particularly the drugs; (3) that careful and accurate diagnosis is essential for any therapeutic procedure or advice; and (4) that treatment of a specific nature, when resorted to, does not produce a permanent resistance, for we cannot alter the inherited constitutional characteristics. The results to the patient, however, are none the less satisfactory, even though sometimes slightly irksome.

DISCUSSION

Dr. Jay F. Schamberg: I have listened with much pleasure and profit to the admirable presentation of this subject by Dr. Cooke. I think he has rendered us a service by emphasizing the distinction between hypersensitiveness to protein and to non-protein substance, so-called anaphylaxis and so-called allergy. There are certain resemblances between these two conditions and certain differences and it is not always easy to determine where the parallelism ends and the divergence begins. There are children who develop urticaria and convulsions from egg white and children who develop urticaria from certain drugs. It is impossible to differentiate the mechanism in the two instances. Urticaria seems to be the chief cutaneous expression of anaphylaxis but urticaria lesions may be produced by a wide variety of causes—foodstuffs, bacterial infections, foreign proteins, drugs, etc. Chronic urticaria, as a rule, is due to an exhausted or lowered state of the nervous system. Many cases of protracted urticaria are due to shock, fright, overwork, or anxiety. The various drugs which are capable of producing urticarial lesions may likewise cause a wide variety of cutaneous lesions. It is questionable whether all urticarial reactions are allergic in nature. Some drug eruptions are probably due to differences in delay of elimination. Bromides are far more likely to give rise to eruptions than iodides and we know that bromides are eliminated much more slowly.

There is one form of hypersensitiveness to which reference might be made which bears a relationship to hay fever and pollen catarrh, namely, hypersensitiveness to poison ivy. Only a certain proportion of people in the community are susceptible, just as in the case of hay fever.

Furthermore, certain patients are susceptible early in life and they lose their susceptibility later in life. I have recently published an article demonstrating that the administration of rhus toxicodendron in minute and ascending doses will enable one to desensitize an individual against ivy poison. I begin with 1 drop of a 1 per cent. solution of the tincture and increase drop by drop until 20 drops are taken three times a day, and then to simplify matters administer 1 dram well diluted merely once a day. My experience is that after taking the drug in this manner for one month the patient is desensitized for a month after the cessation of the same. Then the patient may again become susceptible. I have no doubt that with Primula or primrose dermatitis and oak, sumac and other plant poisonings, similar results can be obtained. Indeed, I have been informed the oak poisoning can be prevented by the injection of rhus toxicodendron. My assistant, Dr. Strickler, has shown that one may make successful cutaneous tests with plant extracts, and desensitization can be effected by subcutaneous injections of plant toxins.

In these patients we remove, at least for a time, a hypersensitiveness to plants. Is this process not somewhat analogous to the hyposensitiveness or lowered sensitiveness which develops in individuals who take a drug over long periods of time? as, for instance, in morphin or cocain habitués who after a time can take doses of these drugs which would be lethal for the ordinary individual.

What is the underlying process in the acquiring of this hyposensitiveness and in the removal of hypersensitiveness when it exists? With respect to vegetable toxins it is conceivable that a specific antitoxin is developed in the blood. It will be recalled that there are two vegetable toxins, ricine and abrin, which are capable of inducing the development of antitoxins in the blood. Indeed, in the case of abrin, antitoxins can be produced locally. Romer applied abrin to the cornea of a rabbit and then made an emulsion of the cornea thus treated and injected the same with a definite dose of abrin into an animal. No effect was exerted, whereas the same dose of abrin without corneal emulsion produced a fatal effect.

While there is evidence to warrant belief that inoculations against pollen hypersensitiveness cause the development of anti-anaphylactins, the possibility that specific antitoxins may be the cause of the induced desensitization is worthy of further study.

There are two types of cutaneous tests, the allergic type, represented by the von Pirquet and another type represented by the Schick test. In the tuberculin test we inject a specific antigen into the skin, and a skin reaction results when a specific antibody is present in the system to combine with it. In the Schick test a minute quantity of diphtheria

toxin is injected into the skin. In this case a skin reaction develops if there is *no* natural diphtheria antitoxin in the system. So we have here two distinct types of reaction, one allergic and the other determining the presence or absence of an antidotal substance in the blood. I am sorry that Dr. Cooke did not have time to allude to the interpretation of the cutaneous reactions. I am quite sure that the personal equation and differences in experience of physicians lead to wide divergence in the reading of positive and negative reactions. Much depends upon the technic employed. If one uses with the food test the abrasive method of scarification of the skin a distinct wheal is developed in positive cases within fifteen minutes. If one uses the method of intradermal puncture, using a fluid food extract, the reaction is delayed and instead of producing a wheal, one develops in the course of twenty-four to forty-eight hours a nodule surrounded by an erythematous halo. So the type will depend upon the technic used and the interpretation of positives and negatives requires a good deal of acumen. I have seen physicians who have carried out these tests and have been informed that the patient was sensitive to sixteen or seventeen different foods of widely different character. It is not probable that a patient will be simultaneously hypersensitive to egg white, asparagus, beef and strawberries—foods of such different chemical constitution. Such results are doubtless due to errors of reading the reactions. The value of the food tests, which I may add is at present *sub judice*, may be enhanced by improved technic in their preparation. I have an impression that the intradermal tests are rather more reliable than those made by abrasion.

Dr. Alfred Stengel: I should like to move that a vote of thanks be extended to our guests who have been so generous as to come over to deliver these papers, to Dr. Eggleston, Dr. Cooke and Dr. Miller.

I. THE BILIARY OBSTRUCTION REQUIRED TO PRODUCE JAUNDICE[1]

By PHILIP D. McMASTER, M.D.
AND
PEYTON ROUS, M.D.

From the Rockefeller Institute for Medical Research.

The bile ducts from some three-fourths of the liver substance in dogs and monkeys can be obstructed without result in any clinical evidence of pigment or cholate accumulation in the organism. And in the dog nineteen-twentieths of the liver substance can thus be placed in stasis without the development of tissue icterus such as regularly follows total obstruction in this animal. Always a local obstruction results sooner or later in liver changes tending to a functional readjustment. Thus, as time passes, the derangement of the organism produced by the sudden stasis becomes progressively less.

The amount of biliary obstruction required to produce jaundice in human beings is probably as great as in the experimental instances. The clinical jaundice often met with in association with local liver lesions should be viewed not as the result of local bile resorption, but as arising from a diffuse injury to the hepatic parenchyma or ducts, or to blood destruction.

II. (A) Vicious Activity of the Gall-bladder during Biliary Stasis. (B) The Determining Factor in the Causation of White Stasis Bile

Ligation experiments in dogs, cats and monkeys show that under stasis conditions the gall-bladder and bile ducts act very

[1] Read May 5, 1920.

differently. The gall-bladder, continuing to exercise functions that are normal to it, effects a great concentration of the stasis bile and adds mucus thereto in quantity. As a result, when an obstruction is produced below the entrance of the cystic duct all of the extralobular biliary channels come at length to be filled with a thick, greenish-black fluid. The ducts, on the other hand, have no concentrating faculty, and their lining secretes but little mucus. In an obstructed duct system blocked off from the gall-bladder, or connecting with one so changed as to be incapable of functioning, there regularly accumulates a limpid, watery fluid devoid of pigment and bile salts even when the animal is heavily jaundiced. This is the "white bile" of the surgeons. The passages soon become so distended with it that true bile ceases to enter them.

The facts as given relate to uninfected and uninflamed bile passages. So far as they go they point to cholecystectomy as a wise measure in gall-stone cases, and notably when the gall-bladder is but little damaged. For an abnormal concentration and thickening of the bile such as the gall-bladder can effect must act both to promote the formation of stones and to render obstruction by them more complete. The frequent rapid increase in size of stones partially obstructing the common duct (Naunyn) is attributable to the concentration of stasis bile by the gall-bladder.

III. The Concentrating Activity of the Gall-bladder[1]

In the previous paper we have noted the fact that the fluid which collects in bile ducts experimentally obstructed is an inspissated, tarry bile when the ducts communicate with the gall-bladder, whereas in ducts unconnected with this viscus the fluid is thin and soon becomes free from pigment and cholates. It has long been recognized that the gall-bladder must have a concentrating function, since bladder bile is more concentrated than duct bile from the same animal; and continued functioning during

[1] From the Rockefeller Institute for Medical Research.

stasis will explain the tarry bile then found. The inspissation occurs so rapidly as to raise the question whether concentration of the bile in periods of intermittent or partial stasis may not be an important favoring element in the formation, of gall-stones.

To determine the rate of concentration, advantage has been taken of the arrangement of the hepatic ducts in the dog. There are three of these, which unite to form a common duct, with the cystic duct emptying high up into the central one. Through an opening near the lower end of this last a catheter was pushed into the neck of the gall-bladder, which was emptied and washed with salt solution; and the duct was ligated after the catheter had been withdrawn. The bile from the middle lobes of the liver had now no way of escape save into the gall-bladder. That from the lobes to either side still reached the common duct, but from this it was collected into a rubber balloon placed in the peritoneal cavity. The laparotomy incision was completely closed. The dogs tolerated the operation well. Control experiments in which a second balloon was substituted for the gall-bladder showed that the separated portions of bile differed little in their pigment content, which was taken as the index to concentration.

On examination after twenty-four hours the gall-bladder, still undistended, was regularly found to contain only one-sixth to one-tenth as much fluid as should on calculation have reached it, but this, thick and dark, was six to ten times as concentrated in pigment as the control specimen in the rubber balloon. The results were the same when, without other variation in the experiment, the gall-bladder was filled to the normal distention with sterile bile of known character prior to withdrawal of the catheter. The contents of the branches of the hepatic duct connecting with the gall-bladder were always examined at autopsy. Here a thin bile, like that in the balloon, was obtained, a direct proof that the thick contents of the gall-bladder had not come as such from the liver.

It is evident that the normal gall-bladder can concentrate bile with very great rapidity.

DISCUSSION

Dr. Stanley P. Reimann: It does seem a little strange that some of Dr. Rous's work has not been done before, because some of these questions seem so obvious. Some questions relating to the pathological side of this subject have, however, been investigated. For example, several years ago papers were published on dissociated jaundice and we became rather interested in that, but we had to give it up on account of the inadequacy of the chemical tests. An attempt was made to differentiate between hepatogenous and hematogenous jaundice, to find in a person with a yellow color whether or not the liver was involved. Nothing definite has been discovered, although the original users of the method have claimed something for it. The question of renal threshold for the elimination of bile pigment or salts came up here, whether cholemia exists without choluria. Occasionally you find a jaundiced plasma without bile salts or pigment appearing in the urine; usually such a patient will not have jaundice of the skin. How this comes about is questionable. The chemical tests are unreliable; we can have no great confidence in them.

If something like 90 to 95 per cent. of the liver is necessarily involved when jaundice is present in a dog, and the same is true in human beings, it leads to something definite in a case like this. We have tried to impress on the surgeons when they took out gall-bladders, the advantage of looking at the liver. Personally, I have seen a number of cases where the gall-bladder was taken out and an obviously cirrhotic liver was present, and no mention made of it in the operative notes. The cirrhotic liver may play more part in the postoperative history of the patient than the gall-bladder ever played in the preoperative history. Here of late I have been receiving little pieces of liver removed at the time the gall-bladder was taken out. If, then, in jaundiced patients 90 to 95 per cent. of the liver is involved, the chances are that something of value can be found in the little pieces of liver. The liver will often be of far more importance to a patient's subsequent complete recovery than the gall-bladder condition, which sometimes is not so bad pathologically as clinical symptoms would lead us to suspect.

The rapidity of concentration of bile by the gall-bladder leads pathologically to the consideration of its power of absorbing infectious products from within its lumen. Cholecystitis and cholelithiasis practically always result from infection. Nearly all gall-bladders show pathologically an involvement of interstitial tissue, showing that either bacteria, or their toxins, or both, have penetrated the walls of this organ. The rapidity

of absorption of which the gall-bladder is capable, makes food for thought when infection of the bile is present.

I should like to ask Dr. Rous whether an examination of the histologic structure of the liver was made in those cases in which perhaps 70 per cent. of the liver was obstructed, whether there was bile pigment present on histologic examination. In a number of livers in which there is extreme passive congestion, the whole central part of the lobule will be more or less destroyed. In these livers you will see pigment in the central zone which we are accustomed to call bile pigment. I would like to know whether patients who have had these massive passive congestions in the central part of the lobule ever did have jaundice from just bile pigment in the central part of the lobule, or whether there must be, for example, infection added to it in the form of cholangitis. The question of the hematogenous *versus* hepatogenous origin of jaundice is still debatable. Can jaundice occur without involvement of the liver? In those studies of dissociated jaundice I mentioned, an experiment like this was made. An animal's blood was obtained, defibrinated, and injected into the spinal canal. Twenty-four hours later some spinal fluid was withdrawn and it gave a reaction for bilirubin. Clinicians regard the presence of bilirubin in the spinal fluid as evidence of hemorrhage into the spinal canal.

This is an intensely interesting and practical subject, and when reliable and simple chemical methods are worked out, I think it will give us a much clearer insight into some of the still puzzling factors of jaundice.

Dr. O. H. P. Pepper: There are a number of points in this paper which are of great interest. The first is the question of fasting jaundice. Have the speakers any explanation for that? Is it a mere lack of the normal stimulus, acid chyme, entering the duodenum? Whether the sphincter of the gall duct by remaining unstimulated is sufficiently tight to lead to jaundice is a thought that occurs. In connection with the deposition, in whatever the fluid, of cholesterin crystals, I should think the analogy of "gold paint" pericardial or pleural effusion might be applied as a possible method of explaining this finding. Finally, to quibble over the word "vicious," I think that it may be possibly misapplied in this instance. Here we have an organ which is secreting or excreting a fluid against an obstruction. Any process which reduces the amount of pressure in the obstructed circulation would seem to me to be scarcely a vicious process. It may be vicious in its by-products, but it is scarcely vicious in its reduction of the pressure, and this is of primary importance in the preservation of the organ and its function.

Dr. Peyton Rous: Dr. Reimann has emphasized the fact that we have been unable to confirm the claims of certain other workers as regards the usefulness of the Gmelin reaction to disclose bilirubin in the plasma. In our hands the test proved unsatisfactory, frequently failing with plasmas that were bright yellow as the result of total biliary obstruction. Such plasmas always yielded a positive diazo-reaction. But it should be pointed out that our observations were upon dogs. Further work is called for with human blood.

The great concentrating activity of the gall-bladder and the marked distinction in this respect between it and the ducts raises the question as to whether the gall-bladder can be the useless diverticulum that some have supposed it. The rat possesses no gall-bladder. Do the ducts exercise a concentrating function in this animal, and will they concentrate stasis bile? We have begun experiments to settle these points and shall make control observations upon mice, for these have a gall-bladder.

The normal contents of the dog's gall-bladder is far less concentrated in pigment than that we have obtained by wholly emptying the viscus through a catheter and allowing it to refill in the natural course of biliary secretion. The fact would seem to indicate that the gall-bladder does not empty itself wholly at each contraction. Probably it contracts only part way and at rather frequent intervals, thus passing on a bile that it has only partially concentrated.

The histological changes resulting from the biliary obstruction have been asked about. It is remarkable how well the dog's liver tolerates a partial obstruction. Only after some weeks does there occur in the region of stasis an orderly, progressive, interlobular cirrhosis, accompanied by a gradual, simple atrophy of the parenchyma. The unobstructed liver portion hypertrophies. Similar changes occur in the monkey but far more rapidly, being well advanced after ten days of partial obstruction.

It is our experience that a considerable quantity of hemoglobin must be set free in the circulation of the dog if one is to find bile pigment in the urine as a result. We have made hourly injections throughout the day, giving each time an amount of hemoglobin just below that which will pass the urinary threshold (1.2 per cent. of the animal's own total hemoglobin, on the average) without obtaining the least bilirubinuria. Of course when bile pigment does appear in the urine as a result of hemoglobinuria one has still to decide whether it is derived directly from chemical changes in the circulation or from the obstruction of bile capillaries in the liver with the thickened bile.

Dr. Pepper has asked whether the concentrating activity of the gall-

bladder may really be considered as vicious; and his point is undoubtedly well taken. The activity is only vicious in that it may favor the formation of gall-stones or lead to obstruction by those already present.

Is all jaundice essentially obstructive in nature, as some would suppose? Our experiments bear directly on this point. We have maintained two groups of dogs, one group normal, the other group with three-fourths of the liver obstructed, and have produced icterus from fasting in both groups under identical conditions. If this icterus is due to obstruction, as has been supposed, it should be greater in the animals with livers already partially obstructed. But no differences whatever were discernible in the icterus of the two groups of animals.

EDUCATION AND HEALTH [1]

By JOHN P. GARBER, Ph.D.
SUPERINTENDENT OF PUBLIC SCHOOLS OF PHILADELPHIA

I HAVE been very much interested in the program of the evening because it seems to recognize what I believe to be most thoroughly true, that in matters of such vital importance as health the education of the people is the important thing. I believe that here in America we have in the past relied entirely too much upon the enactment of law for the correction of evils and the bringing about of a larger degree of welfare; and I am very glad indeed to see that we, as a people, are turning more and more fully to the thought that the best results will not be secured until we educate people in matters pertaining to health, giving them the knowledge and inculcating the habits that will take care of these vital things. I am also convinced that this education will not be effective, unless we do something more than merely take care of the education of the child in school. It is not far-reaching enough in this education in health to begin with the kindergarten child nor even in the home before the child comes to the school.

So far as the schools are concerned, we lose very much indeed at times from the way in which our work is undermined and supplanted by the influence of the home and the community. We recognize the lack of economy in our educational work because we have not recognized as we should all the factors entering into the education of the child. Three of these main factors are the home, the school and the community. The work of the schools is well organized and its importance generally recognized and

[1] Read June 6, 1920.

supported; but, insofar as the home and community are concerned, we are just beginning to appreciate the fact that we have done very little indeed toward carrying on anything like an organized effort to bring them into any educational scheme, or in the way of recognizing their importance in any program of human development. I am reminded very much of that over-economical mother who was in the habit of gathering her children together in the evening and saying: "Now what one of my kiddies would rather have a nice new penny than his supper?" Child-like, many of them would choose the penny. On the following morning she would then gather in these pennies as she persuasively announced: "What one of my kiddies would rather have a nice breakfast than his penny?" There has been entirely too much of this give-and-take-away policy in our educational practice and, as in the case of the "canny" mother, the children have been the losers from our uneconomical procedure. I am very glad that we have a Commissioner of Health in Pennsylvania who is also an educator, because I know that he sees all sides of the problem—the home and the community, as well as what we are doing and need to do in the schools.

I am going to take this opportunity of stating in a general way what we are attempting to do in the public schools here in Philadelphia, in the hope that you may have some suggestions to make to us in the way of improving our work in this vital subject. In the first place, we are endeavoring to carry on, systematically and regularly, health instruction. We have a course of study which we have endeavored to make as good as we possibly can, and we have regular periods provided for imparting this instruction. Then we also, during opening exercises particularly, endeavor to create a spirit which recognizes the importance of health. We also observe the various days and opportunities set aside by the city and various organizations interested in health for laying special emphasis upon the importance of the matter. We do this because we want the children to feel that there are others besides their teachers who are interested in this important subject—the big outside world

that has such tremendous influence upon the child. But we also recognize what has so often been stated, that, after all, health-knowledge is ineffective until it is carried over into health-practice. And, indeed, until our health expenditures and our health legislation eventuate in health-habits we will not get very far along on our health program.

So we endeavor to appeal to the children along lines that will establish health-habits. To accomplish this we, in the first place, make use of their instinctive love of activity. We appeal to them through the various physical education exercises given to them in the school and also through their free recreations and their supervised play. We have a well-organized department of physical training which looks after this, and those of you who may have seen some of our Play Days and particularly our great annual event on Belmont Plateau, when we usually have from 16,000 to 20,000 people present, have recognized that through these athletic events we have been able to appeal successfully to the children. Along the lines of these athletic contests we are following the plan of endeavoring to get the entire school actively interested. They are not merely team contests, meaning by that merely the contests of picked groups with the rest sitting by and applauding the team. We have contests that bring in all the children, girls as well as boys, young as well as old. We make another appeal for the establishment of health-habits along the line of the child's pride, and we endeavor to do this by arousing interest in its future personal appearance. Here we take into account such matters as cleanliness and avoiding round, stooped shoulders and also the various ways in which we can appeal to the pride of the child for establishing good health and the vigor and strength that mean so much when accompanied by good health-habits. A third thing we attempt is to safeguard the health of the children. We endeavor to do this by having sanitary school buildings. Now I admit, of course, that we had rather a bad heritage from our older conditions in regard to some of our buildings, but the Board of Education has done well with

its funds, even with some of these older buildings, in the way of putting them into a sanitary condition; and I believe anyone who examines our most modern buildings will agree that they will meet the standards of any school-building anywhere, even the highest in standards of any place in the United States. We also look after the nutrition of the child through our school luncheons. We have school luncheons that are self-supporting, where children can get food at a minimum cost because these lunches are merely self-supporting, with no feature of profit allowed. We have these luncheons in all of our high schools and in twenty-five of our large elementary schools. Then we have a department of medical inspection that sends trained physicians daily into the schools to detect the presence of disease and to foster sanitary conditions. The number of these inspectors should be largely increased in order to carry on, in a proper way, this safeguarding from the spread of contagion and especially in detecting individual physical defects and looking after their correction. We also do "follow-up work" through the employment of nurses, and this, as has been indicated, is certainly one of the most important features of any system of medical inspection. This is true because not only the child but also its parents must be made aware of physical defects and then there must be the necessary continued insistence brought to bear upon the home. This, in general, represents the things that we are doing or attempting to do in the schools along the lines of health education.

In regard to the greatest needs of our Philadelphia schools along health lines:

1. We must spread the influences of this health education through the schools into the community to a very much larger degree. Two or three years ago, when we brought out a new course of study in health instruction, we had splendid coöperation from the health authorities of the city, as well as from our own medical inspection department, in carrying out a series of health talks, five in number, in all of our school communities. I believe, from what I have seen of the influence of that program, that it was exceedingly valuable, even though it covered only five talks

and was given only during that one year. We should have a well-organized program of community work through which to develop an intelligent and sympathetic attitude toward problems of health, as well as toward other vital things. This is probably the greatest need, as I see it, in our Philadelphia school system today. We asked the Board of Education to give us a Director —one who would take charge, organize and see that this type, of extension community work would be carried on systematically, and with some inspiration put into it. The Board did not see its way at the time to grant this, but, fortunately, they merely held it in abeyance, and any way in which you can assist us in getting that program carried out I feel certain will not only be of service in this important matter of health instruction, but also of value along a great many other lines.

2. Then we still have some playgrounds connected with our public school-buildings that are not well adapted to their purpose. I am sorry to say that we still have some sixty in which there is less, in many cases very much less, than ten square feet per pupil for play purposes. In fact we have one or two yards in which all of the pupils of the school could not be placed even when standing packed very, very closely. Of course, such enlargement is often an expensive proposition, particularly here in the center of the city where buildings have to be purchased and torn down; but, certainly, nothing is too costly where the welfare of the child and the welfare of the city are involved. I believe most fully that ample outdoor play space should be provided for all schools.

3. I also believe our school luncheon service should be extended as rapidly as the funds of the Board will permit.

With these things attended to, I believe that, although we have done a great deal, we can do so much more that is valuable that it is well worth while. I hope that you are all interested and will assist in bringing about these desirable extensions.

In closing, I will speak briefly of an experiment, or at least a new movement, that we are undertaking in the Fourth Ward, one of the crowded wards in the downtown section. The Board of Education has authorized the carrying on of an intensive

health campaign in that ward. We have the coöperation of the various organizations, other than the schools, that are interested in the problem, and in three of the schools authorized by the Board we have installed a lunch system and are endeavoring to work out a type of medical inspection and nurse service that will represent adequate work. In this service every child, at least once a year, preferably twice a year or once each term, is to be examined carefully, physically, and a card is to be filled out and sent home in order to let the parents see whether the child is in normal health or has physical defects. This card is to follow the child throughout its school life—thus to serve as an index of its health. We are also endeavoring to establish in the same district full cooking instruction to be given to the seventh and eighth year girls. To these cooking schools we are inviting the parents of the community, many of them being foreigners, with the purpose of instructing them in regard to nutrition, the various ways of preparing food, preserving it, and taking care of it, also of showing attractive ways of serving it. We have been slow in getting the matter started because of the difficulties in regard to the transportation of some of our material. For example, scales for weighing the children ordered in February from a firm in this city have not been secured because they were not able to get them transported here from the factory from which they were ordered, and it seems we cannot get the order filled anywhere else. But we expect to have this work in full operation by the opening of school in September, and then we hope to demonstrate to the Board of Education and to the community at large that it pays to have these things well done in our schools—that proper health service is a paying proposition. In other words, from the standpoint of the entire cost of educating a child, we believe we will be able to put through an adequate health program, do it more efficiently, and ultimately do it under no greater cost than is now represented in the education of the child.

DISCUSSION

Dr. A. C. Abbott: When the figures that resulted from the physical examination of the first draft were available the results were so appalling that the community was aghast. We were told that of six million men of military age pressed into the service of their country one-third of them were incapable of rendering any kind of service whatever. That fact I should like to let sink into your minds. One-third of six million men incapable of rendering any service to their country whatever, either because of physical or mental defects! These figures, and an analysis of them, are now available. In the last publication of the Adjutant-General's Office we find in an analysis of defects among drafted men certain things which leave no doubt in the minds of those familiar with such matters that most of those defects were preventable, that many of them were curable and many of them could have been very much improved had there been sufficient wisdom on the part of someone to try to improve them during the youth of the men. The impression that the thoughtful part of our community has acquired as the result of reading these figures has resulted in a widespread desire to do something in the way of teaching preventive medicine or personal hygiene or whatever you may choose to call it. My thought is, now that an analysis of the defects is available it would pay us to direct our energies along the channels suggested by it. The figures that comprehend hundreds of thousands of men are safe indices of the directions in which our efforts should be directed. I shall not attempt to quote the analysis, and as I have not brought the figures with me I fear to trust my memory. There is one large group: Diseases of the heart and arteries. We know pretty well what is the cause of that and we know many of these causes can be removed. Of the orthopedic defects we know an enormous number are preventable and correctable; as a matter of fact, of the men accepted in service a great many known to be defective were accepted. They were placed under treatment and in an astoundingly short time were serviceable men, perhaps not for the line of combat, but still able to render some useful service to the Army. We have got to organize our effort along these lines in which we are likely to get results. I am not disposed to suggest any line of action that is not pretty well worked out. Random schemes that are projected with the hope of striking something, are usually disappointing. Such are not necessary; we have a safe guide pointing the direction in which to go and that is the direction in which physical education, personal hygiene instruction should tend. One of the most important points

is the effort now being made to secure a sufficient number of competent instructors to disseminate useful knowledge throughout the public schools of the country.

There is nothing mysterious whatever in the subject of personal hygiene. It is the personification of common sense. The most of it that is worth while could be taught in one syllable conferences if it be taught by persons who have force of character enough to believe it and who have sufficient knowledge to know the psychology of the young mind they are trying to teach, I see no excuse whatever for public school teachers in this or any other state not being required to teach personal hygiene. I know that persons who desire to do this work can be properly prepared in a very short time. At the present (I am not sure it will last) we at the University are one of the beneficiaries of the Interdepartmental Social Hygiene Board of the Federal Government. They gave us enough money last year to enable us to employ for this specific purpose persons who were trained and those persons are now utilized not only in connection with this work, but likewise for the giving of a well-organized and systematized course of instruction in personal hygiene in the School of Education. The School of Education is that department at the University in which prospective teachers come who have usually been through the Normal School but who wish to go further in their education to become better equipped teachers and do advanced work. These lectures are given now to all those persons who intend as soon as they are graduated to become candidates for the position of teachers in the public schools of the State of Pennsylvania. It is a very great pleasure for me to say that my first meeting with Dr. Finegan, our State Superintendent of Public Education, was most satisfactory, because when I laid before him what we were doing he at once became interested and at the end of the interview made this remark: "If I am politically strong enough at the end of this year I shall require of every candidate for a license to teach in the public schools of the State of Pennsylvania a certificate to the effect that they have had the teaching that is given in the University of Pennsylvania on Physical Education and Personal Hygiene, or a course equivalent to it." Now that is the biggest advance that has been made yet. It strikes right at the bottom of the matter. It takes care of the coming generation. I am not particularly interested in the present generation. The present generation has lost its plasticity, it is thinking for itself and often thinking wrongly. It really thinks itself interested in questions of hygiene, but you have only to recall the unsanitary environment of many of our population or to try to awake interest by public meetings to see how almost hopeless it is to interest the present generation. But just as you were taught at your mother's knee that it

is more comfortable to be clean than dirty, and by experience, if you eat green apples you are likely to get a "tummy-ache," so if hygiene can be taught in that way, not as an occult side line, but as an everyday matter then hygiene becomes a living thing. If we rob the teaching of all unessential matters I am sure it can be effectively taught in the lower grades of our public schools, and I hope it will be.

Mr. John A. Vogleson: The words of the preceding speakers have been full of encouragement to the health officers. The work of the health officer at the present time is largely constituted of the exercise of police power. Police power is manifested through the community in the abatement of nuisances and in food inspection, but what has been said here tonight leads to a higher line of work for the health officer, the line of education. The keynote of the health officer's work at the present time is one of prevention and to apply the principle of prevention we must have thorough education. Dr. Abbott said in his remarks that he had no interest in the present generation, that the babies were quite different. We look to the children who are now in the schools to apply many of the principles that should be applied, to attain the best health conditions in our city and in our state. But we do something for the older generation also and that is done principally through our public-health nurses. The efforts of the public-health nurses, the city nurses, is with the work in caring for the children in their earlier years, and when that child passes on into that public school he comes under the supervision of our medical-inspection service, and the one thing that I want to leave with the audience in regard to the medical-inspection service is the responsibility of the parent in carrying out what our medical inspectors find. I do not want to speak too much on what Dr. Cornell will say as he follows me, but in 1918 the average number of physical defects per child found was 1.7 per child, in the year 1919 that number averaged 0.97 per defect of the child examined. Of these defects 45 per cent. approximately were corrected. That was very good and was encouraging to the health officer, but he also thought of the 55 per cent. that was uncorrected, and an examination of this 55 per cent. uncorrected showed that refusal to correct the defects pointed out by the medical inspector in 85 per cent. had been direct refusal on the part of the parent to have done those things which were obvious and needed correction for the benefit of their children, and that to me is a deplorable condition —that 85 per cent. of the defects that are pointed out, found by the school medical-inspection service, should receive the direct refusal of the parent to have a remedy applied, and to that part of the problem in the present generation we must direct a most particular effort.

Dr. James M. Anders: It may be a matter of interest to this audience to learn that on the occasion of the celebration of the fourth annual health day on May 12 the teaching of personal hygiene in our public schools was decidedly stressed. Perhaps the majority of pupils in our parochial or public schools were either lectured to on, or had their attention drawn to, this subject of personal hygiene. The object was to impress the youthful minds with the importance of knowing how to take care of the body. I am one of those who believe that there is a great deal of educational waste, and chiefly perhaps for the reason given by President Hollis Godfrey recently, when he said that industry had not as yet clearly defined its specific needs. Every man, woman and child, however, it must be clear to all of us, should possess a knowledge of the elements of personal hygiene and utilize it. And from what has been already said by Dr. Abbott and by others tonight, now is the time to begin particularly in view of the fact that the recent world war revealed our physical inferiority as a race. This to my mind is not a local question, it is not a state question, but a national one and the place to begin to rebuild or build up the national physique is in the public schools. It is an axiom, but one which I think cannot be too often repeated, that what you would have appear in the matured generation you must put in the curricula in the public and secondary schools, as well as our colleges and universities. All of us agree that systematic, daily, theoretic instruction in personal hygiene is needed in our public schools, but the nature and extent of that training are matters of vital importance which have not as yet been completely worked out. One thing is clear, namely, that we cannot leave these details at the present time to the judgment of the teachers themselves, because as they have repeatedly confessed to me, they have not been sufficiently trained hitherto to give a satisfactory course. It is believed, and it is practically assured from what I have heard Dr. Abbott state, quoting Dr. Finegan, that in the immediate future our teachers most probably will be adequately trained (in personal hygiene) to give this course, particularly in the elementary schools. In the meanwhile, it seems to me we should provide ourselves as speedily as possible with suitable text-books and that these should be used by the teachers until they have been sufficiently trained as a class to carry out this program properly. This could readily be done by some of our hygienists; and a single elementary text-book, or at most two, to meet the needs of the different grades could be quickly provided. It has been intimated here tonight that every school should be a nursery of health as well as of intelligence; hence, every school should be in a sanitary condition, as well as its surroundings, and I was glad to hear what Dr. Garber said in regard to the comparative excellence of the newer school buildings in Philadelphia.

I am sure we are all agreed that there should be ample time, space and apparatus, if you please, provided for recreation exercises for the public-school children, and we should bestir ourselves and should come to the rescue and assistance of Dr. Garber and others interested in this matter of educational exercise, and aid them in every possible way by influencing public sentiment in favor of extension of work along these lines. I think too little stress has been placed upon the daily drill exercise as a means of strengthening and developing the weak frames of children. I do not know to what extent this is done in Philadelphia, but in the broad sense there is no better method of developing the children physically than the daily drill training if properly carried out. We must remember that it is during school life that the human organism is in the greatest need of properly directed exercise. I will not prolong this discussion, but what I said in regard to public schools is true with almost equal emphasis of our college and university student life from the standpoint of their physical needs. In closing, may I suggest that, since the systematic teaching of personal hygiene is a necessary part of our public-school curriculum, and since physical training must go hand in hand with this, these two closely allied branches should be conducted under one and the same head for the sake of proper coördination of the work. I for one hope that our united efforts may prove a stimulus that will aid in giving the rightful places in the curriculum of our public schools, colleges and universities, to teaching of personal hygiene and physical training.

Dr. Walter S. Cornell: The fundamental rules of health are simple. Probably they can be written in thirty rules. If standardized and simplified no doubt they could be taught to every child of ten years, and with understanding to every child of twelve years. By drilling the children thoroughly, as the child in Sunday School is taught the Ten Commandments, they would make a lasting impression.

The combination of class instruction and practical application will open the child's eyes to the physical defects numerously existing in those with whom he comes in contact. The person who has learned to observe the marks of ill health in others will be struck by the pallor of the majority of office and shop workers. Toward the close of the day, as hundreds of these pass through the gray stone archway of the City Hall, their appearance is often actually ghastly. Conversely the perceptions of the child should be trained to appreciate the beauty of good health, as shown by good complexion, good teeth and erect carriage. We physicians have inspiration in this hall of the College of Physicians from the portraits of Rush, Agnew, Mitchell and other leaders. So the school child, taught the subject of good health, should have inspiration in the classroom from pictures or statues illustrating the perfect physique.

The teaching of the rules of health is facilitated by dividing the subject, for more systematic presentation, into four parts: (1) The maintenance of good nutrition through rest, fresh air, good food and exercise; (2) the sequence of defects, whereby a few original or primary defects, existing in early childhood, produce many secondary and tertiary ones in the course of a few years; (3) the avoidance of contagious diseases, through avoidance of overcrowding, hand-to-mouth infection, and general personal uncleanliness; (4) the principal physical defects found in children, and the means of their correction. By the time the child has grown to college age, the twig has been bent so long that the tree is often permanently inclined.

Attention may be called at this time to the value of practical work in the teaching of hygiene. The organization known as the "Modern Health Crusade" is doing good work by appealing to the children throughout the country to crusade against disease by the observance of hygienic habits. The children are very proud of their little badges showing that they are knights or 'squires in this crusade. I have no doubt that it would be a very good custom to give to the school children, every month, certificates of merit for the observance of the rules of health and the prompt correction of physical defects found by the medical inspectors. Inspirational literature could also be printed on the backs of these certificates. The relation between good health and material success could there be emphasized—a feature which Superintendent Garber has just mentioned.

Our success in the correction of physical defects in the Philadelphia schools is a little better than Mr. Vogleson has stated. We secure the correction of about 52 per cent. of defects found by the medical inspectors. In this connection please note that at the Bureau of Compulsory Education, where the issuance of the child's employment certificate depends upon his physical condition, a great majority, about 75 per cent., of the defects found by the medical examiners are promptly corrected. I do not advocate paternalism, but the contrast in these results to our general results shows that with the proper lever, parents can be made to act.

One more influence in the improvement of the health of children is the active interest of members of the Board of Education. At this meeting, it would have been a wide inspiration to have invited one or more of the non-medical members of the Board. An active interest by the Board naturally results in liberal provision for the children's health.

The Fess bill, which is now before Congress, looks toward universal physical education and medical inspection. I am in accord with the

general purpose of this bill, although I believe that the regulatory powers vested by it in the United States Commissioner of Education are too great and will do harm by stifling local initiative. A college worker will get the viewpoint of us who work in the public-school system by conceiving of the same general and direct regulations applied to college work, with enforced uniformity. It seems to me that the functions of the Federal Bureaus should be educational rather than regulatory and restrictive.

However, by whatever agency, it is our hope that the people will be generally awakened to the importance of good health. School medical inspection has existed in Philadelphia since 1905, and it would be of interest to compare the United States Army figures on the results of physical examinations of registrants under the Selective Service Act, for this city, with those of other places. The Report of the Provost Marshal General, of date July, 1919, unfortunately does not give this information.

RECENT ADVANCES IN PYELOGRAPHY[1]

By WILLIS F. MANGES, M.D.

The history of rendering the urinary tract roentgenographically visible dates back as far as 1897, when Tuffier suggested the use of the opaque catheter to show the position of the ureter. This was only two years after the discovery of the rays. The entire urinary tract was probably first shown clearly on the roentgenogram in 1906 by Voelcker and Lichtenberg. They had attempted to show the outline of the bladder by filling it with collargol solution and found that in one instance the ureter and kidney pelvis were completely shown on the plate. Since that time many ray opaque solutions have been used and almost as many discarded. Those more commonly used were solutions of collargol, argyrol, cargentos, silver iodid in emulsion and more recently thorium nitrate, potassium iodid, sodium iodid and sodium bromide solutions.

It is not within the province of the roentgenologist to discuss either the history, development, or technic of cystoscopy, ureteral catheterization and injection of the opaque solutions. We will, therefore, omit such discussion except insofar as it may be necessary to properly correlate the work of the cystoscopist and the roentgenologist.

In the earlier days there was a great deal of criticism against the injection of any material or solution into the kidney pelvis, because of frequent severe pain, injury to the kidney and occasional fatality following such operation. Much of the criticism was justifiable, but as in many other medical and surgical procedures, has led to improvement in methods and materials until

[1] Read October 6, 1920.

now the causes of pain and injury are fairly well understood and can for the most part be avoided.

Pyelography is indicated: 1. When a surgical operation on the kidney is contemplated.

2. When the function of one kidney is very much below normal.

3. When the cause of renal colic is not otherwise explained.

4. When in the roentgenogram there is a stone shadow within the possible limits of the kidney area.

5. In case of tumor in the kidney area.

6. In most cases of renal hematuria.

7. When there is evidence of infection of one kidney.

8. Movable kidney associated with renal symptoms.

9. Suspected anomalies.

The contra-indications according to Braasch[1] are, briefly: In hypersensitive, frail individuals; in cases where there is evidence of renal insufficiency, marked emaciation, acute infection, or in large hydronephrosis where the diagnosis is evident by other means. Emerson adds to these the aged and infirm, and when there is evidence of marked bilateral involvement or when surgery is contraindicated. Bilateral injection at one operation is now considered inadvisable in any case.

In recent years the cases for pyelography have been selected more carefully. There are an increasing number of conditions in which pyelography is indicated, but this procedure should not be a preliminary step in the diagnosis, rather a final one to be resorted to only when some definite diagnostic point is to be decided.

Perhaps one of the most important steps in advance has been in the discovery of opaque solutions that are free from toxic effect if absorbed by the kidney. The use of colloidal silver preparations has been abandoned. Following these, silver iodid in emulsion was first recommended by A. A. Uhle and G. E. Pfahler,[2] and later by H. A. Kelly and R. M. Lewis.[3] This, too,

[1] Pyelography, 1915, W. B. Saunders Co.
[2] Ann. Surg., 1910, line 1, pp. 546–551.
[3] Surg., Gynec. and Obst., 1913, xvi, 707, 708.

is seldom used for pyelography but is used by some in cystography. It is probably the least irritating of all mediums to the bladder. The thorium nitrate solution of Burns was then advocated and very widely used. Then Cameron[1] recommended 25 per cent. solutions of the iodides of potassium and sodium, and later 17.5 per cent. solution. The most recent is that of sodium bromid in 20 or 25 per cent. solution, recommended by Weld. E. H. Weld[2] reports a death occurring nine hours after injection of thorium nitrate, and attributes it to the toxic effect of that particular specimen of solution. He conducted a series of experiments on dogs by injecting intravenously solutions of thorium nitrate, potassium iodid, sodium iodid and sodium bromid. His conclusions were, briefly, that 20 per cent. solution of sodium bromid had no toxic effect up to 55 c.c., except a slight increase in blood-pressure. Small quantities of 20 per cent. potassium iodid solution (2 or 3 c.c.) caused a drop of blood-pressure to 0 and almost instant death; 50 c.c. of 20 per cent. solution of sodium iodid caused only slight reaction. The toxicity of the thorium nitrate solution varied with the age of the solution, older solutions being more toxic, and the action was directly on the heart. In a later series of experiments E. H. Weld[3] also proved that any of the usual pyelographic mediums will be absorbed by the kidney if retained in the pelvis. His experiments on dogs included sodium bromid, sodium iodid, potassium iodid and thorium nitrate. He first injected the solution and then ligated the ureters. Radiographic shadows of the opaque solutions disappeared in from one to one and a half hours. Kidney removed in from one to three hours showed acute congestion in the medullary portions, with the cortical portions normal. There was no difference in effect of these solutions on the kidney tissue.

It would seem then, that from the viewpoint of possible absorption, potassium iodid should not be used at all, that the thorium solution should be fresh and very carefully made. The solutions

[1] Jour. Am. Med. Assn., June 14, 1919, lxxii, 1737.
[2] Toxicity of Pyelographic Mediums, Jour. Urol., October, 1919, iii, 415.
[3] Renal Absorption with Particular Reference to Pyelographic Mediums, Med. Clin. of North America, November, 1919, iii, 713.

of sodium bromid or sodium iodid seem to be the preferable ones. They have the advantage that they can be sterilized by boiling and are easily obtained chemically pure. They have the disadvantage of being irritant to the bladder when there is even a slight degree of cystitis.

As to the technic of catheterization we have but little to say. Certainly we have many physicians now who are skilled in this art, and we believe that most of our former discouragements and apprehensions are relieved because of this increased skill. We prefer when possible that the catheter be of opaque material, and would rather have it a few centimeters in the ureter without the use of force, than to have it reach the kidney only after considerable trauma to the ureter. Extreme gentleness is essential throughout. Injection should be made by gravity, and the flow should be very gradual.

In some of the larger urologic clinics the cystoscopic table is also the radiographic table, and when plates alone are depended upon for the diagnostic data this is certainly very desirable. None of these tables, so far as we know, permit of fluoroscopy during the injection. This is a phase of the technic to which we attach the utmost importance in the clinic at Jefferson Hospital. It is necessary for us to move the patient from the cystoscopic room to the fluoroscopic room. Occasionally the catheter is not found in the ureter, but aside from this we have had no reason to discontinue the practice.

We have previously described in more or less detail the advantages of injecting the opaque solution under fluoroscopic control, and for the sake of brevity have used the term "pyeloscopy."[1] We have resorted to pyeloscopy in the first place because of the numerous failures to get a satisfactorily filled pelvis when depending upon the plates alone. These failures were due to rapid regurgitation of the fluid, faulty position of the catheter, leaky catheter, premature apprehension on the part of the patient, etc. In addition to overcoming these difficulties we find there are many

[1] Manges, W. F.: Pyeloscopy, Am. Jour. Roent., April, 1918.

other advantages in visualizing the filling process. The rate of flow is easily controlled, and this is important for the reason that a rapidly filled pelvis causes a great deal more pain than one filled slowly to the same degree of distention. One can usually anticipate the patient's discomfort and avoid much of it. It is possible to manipulate the kidney and determine the degree of mobility. In case of advanced pyonephrosis one readily avoids the dangers of overdistention. When stone shadows or palpable tumors are present we frequently get valuable information from the screen that we would miss entirely without it. These and other points of advantage will be demonstrated by means of lantern slides presently. You must bear in mind, however, that the fluorescent screen shadows are seen only for a short time, and that one cannot see fine detail. The pyelogram, therefore, is essential for prolonged and careful study and for the interpretation of finer changes in the pelvis and calices.

In advanced lesions interpretation of the pyelogram is not at all difficult, but in the early stages or borderline conditions the interpretation is at times extremely difficult and must lean heavily on the other diagnostic data and history.

It will probably be better to speak of the main points involved in interpretation while showing a few slides. Some of these slides have been used to illustrate my former paper on pyeloscopy, and for this I beg your indulgence.

PNEUMOPERITONEAL *X*-RAY DIAGNOSIS[1]

By W. H. STEWART, M.D.

This method of diagnosis was first used by Kelling in 1902 in two cases of cirrhosis of the liver in which there was considerable ascites. He replaced the fluid with air, and made an *x*-ray examination, revealing the excellent detail of the liver. The method evidently did not make much impression upon the profession, as nothing further was done along these lines for eight years, when Jacobaeus succeeded, after experimenting on animals, in outlining many of the solid organs within the peritoneal cavity. He also introduced peritoneoscopy which is an examination of the abdominal organs by means of a cystoscope which he introduced into an abdomen which had been inflated.

Pneumoperitoneal *x*-ray diagnosis is not supposed to be antagonistic to any other method which we have, but to be used in conjunction with others such as the barium meal. I shall briefly describe the technic and show some slides.

The patient is prepared in the usual manner as for an examination of the kidneys or of the gastro-intestinal tract. He is placed upon a stretcher or table and the usual surgical preparation is made. The three instruments used for inflation are the ordinary lumbar puncture needle, a rubber tube and an ordinary tank of oxygen or of whatever gas is to be used. A point about half an inch below the umbilicus in the median line is selected and the needle introduced without local anesthesia; simply pinching the skin seems to render the introduction of the needle not uncomfortable to the patient. It is passed toward the bladder in an oblique direction in order to obtain a sort of valve action, preventing the escape of

[1] Read October 6, 1920.

the gas into the extraperitoneal structures; such an event interferes with good roentgen detail. If adhesions or an abdominal scar are present, we naturally avoid that site. After passing the needle down to the fascia and hesitating for a moment a quick puncture will go through into the peritoneal cavity. There are a number of ways to determine whether the peritoneal cavity is entered; some men use injections of saline solutions, while others depend on a slight roar which is heard as the gas enters the peritoneal cavity. If the cavity has not been entered you will feel the artificial emphysema produced in the extraperitoneal structures.

The advantages of the examination are that the *x*-ray shows with more detail than with the ordinary method, any organ of considerable density within the peritoneal cavity. In the presence of air or gas in the peritoneal cavity the structures are freely movable, and when the patient is turned on the side you will see the intestines flop over almost as with a splash, revealing the detail of the solid organs.

The danger to the patient is the important point. This may be summed up in two particular items, infection, and the possibility of puncturing the intestine. The first can be overcome by the usual surgical precautions. In more than 100 cases we have encountered no trouble. In consideration of the second objection it was found in experimenting with animals that a sharp body introduced into the peritoneum caused marked recedence of the intestines. Particularly in the live rabbit they would actually recede from a sharp point, whereas immediately after death it was possible to puncture the intestines without difficulty. Many foreign bodies swallowed by infants pass through the intestinal tract without causing any disturbance.

The method has been accepted in this country much more readily than we expected, particularly in the West. We have kept in very close touch with the situation and, so far, only two cases have been reported of puncture of the intestines. Both occurred with the same operator. In the first instance the surgeon noted that when he turned the oxygen on, instead of

inflating the abdomen the outline of the intestines was distinctly seen upon the abdominal wall. The operator became panic stricken, had the patient returned to bed and awaited developments. There was no trouble whatever, not even a rise of temperature. He had a second similar experience. Roentgenograms showed that he had punctured the large bowel. In neither case was there any reaction.

When Dr. Stein and I first took up the work in 1919 we used oxygen entirely. We found that it was absorbed in the peritoneal cavity in from twenty-four to forty-eight hours. Thirty per cent. of the patients had considerable pain, mostly in the shoulders, due largely to elevation of the diaphragm. Much of the objection to adopting the method in New York was because of the amount of pain which this 30 per cent. of the patients experienced. We, therefore, have been working on methods of improvement. The first of these was deflation. As soon as the patient was inflated and the *x*-ray examination made the needle was reinserted and the oxygen drawn off. It was found best not to leave the needle *in situ*, because in making the examination it is necessary to place the patient in many different positions, and that there would be considerable danger of damaging the peritoneum from the retained needle. Our third advancement was the giving of a hypodermic of morphin just before the inflation and then to deflate after the roentgen examination had been completed.

About this time Dr. Alvarez, of San Francisco, read of our work. At the time, he was experimenting with animals, in a study of peristalsis of the intestinal tract, carbon dioxide had been used. He found that it absorbed rapidly in the intestinal tract of animals and, therefore, began to use (CO_2) to inflate the peritoneal cavity of human subjects instead of with oxygen. Experiments showed that this gas would be absorbed in about fifteen minutes. This, of course, was a great advancement, because if the patient did have any pain, you were able to say, "It will be over in fifteen minutes." CO_2 when combined with a hypo of morphin before the examination seems to be ideal; the morphin controls the pain until absorption of the gas has occurred. The

difficulty is, however, that fifteen minutes is hardly long enough for making a satisfactory *x*-ray examination. We, therefore, have been combining carbon dioxid with oxygen, using two parts of carbon dioxid and one of oxygen. The time of absorption of this mixture is about thirty minutes, which is sufficient for an *x*-ray examination.

In gall-bladder work, or work in which one wants to limit the ray to one particular organ, the carbon dioxide is probably the best to use. I lay particular stress upon giving the morphin with the carbon dioxid; it has been the one factor more than any other which has influenced the acceptance of the procedure.

We regard as contra-indications to the method, any acute inflammation of the abdominal cavity, or any heart lesion. A valvular heart lesion would certainly be a contra-indication because of pressure being brought directly upon the heart by the gas. There is a certain type of elderly person of alcoholic habits in which the method should not be used. We have never seen any serious effect in such instance, but our advice is against its use in this class of cases. Its use is indicated in all obscure cases in which it is necessary to outline the solid organs, and in which the information desired cannot be obtained by the ordinary method of *x*-ray examination.

The slides are shown to demonstrate the value of the method without going into the technic of the procedure.

DISCUSSION

Dr. Henry K. Pancoast: The peritoneal and pleural cavities represent potential spaces which may be made visible by distention with gas and the absence of shadow, just as the various portions of the gastro-intestinal tract may be visualized by means of opaque contents. Everyone is familiar with the appearance of pneumothorax in which the distended pleural cavity is made prominent because of the lack of density of the air contained therein in contrast with the shadows of the collapsed lung and the ribs. We are also familiar with the contrasting shadows

of opaque substances, such as bismuth paste, in the pleural cavity, especially when used to outline smaller cavities in empyema. It is possible in this manner by making stereoscopic plates to show the exact size and extent of chronic empyemic cavities and the amount of thickening of the pleura. In the case of the peritoneal cavity such opaque substances may also be used to outline chronic sinuses, but in order to show the entire peritoneal cavity it is necessary to use some non-opaque medium like gas in order to outline the cavity and the various organs contained therein. Either gases or various opaque substances are used in many parts of the body, depending upon whether we wish to obtain density in the cavity or density of the surrounding structures. Opaque substances are very important in outlining sinuses in other parts of the body aside from the pleural cavity; for instance, in old sinuses from Pott's disease, psoas abscesses and sinuses in the ischiorectal fossa. Dr. Manges has called attention to the use of opaque solutions in the urinary tract in making shadows of the pelvis of the kidney and the ureters. Naturally, gas or air would not be effective or probably safe in work of this kind. I agree entirely with Dr. Manges in his statement that fluoroscopic control is a very valuable adjunct in pyelography and I believe its importance in this connection is equal to the fluoroscopic control which is employed during the process of barium enemata for examination of the large bowel. Its use is particularly important in examining the ureters for kinks.

When I heard Dr. Stewart's first report on the subject of pneumoperitoneum a year or more ago I was not favorably impressed with the method and I could not see how it could be any better than exploratory operation. This belief was held until personal experience with a case convinced me of its extreme value, and now I am glad to express a diametrically opposite view on the subject. We have used the method in only three instances, but in each one it has been of the utmost diagnostic value. In one of Dr. Stengel's ward cases recently examined the *x*-ray examination of the chest seemed to indicate a growth in the liver pushing the diaphragm upward in an irregular manner. The clinical diagnosis strongly favored a pathological condition above the diaphragm. In order to settle the matter we suggested that the patient be examined after the injection of oxygen into the peritoneal cavity. It was very gratifying to all of us to see the liver separated from the diaphragm by the presence of gas between the two structures and to prove in this manner that the condition was entirely above the diaphragm. A collection of pus was subsequently shown to be present at operation.

It is unfortunate that Dr. Dandy could not be present at this meeting in order to give us a talk upon the value of the injection of air into the

ventricles of the brain. We have employed this procedure in only a few cases and in none of them has it proved to be of very much diagnostic value. In one of the cases examined we were unable to get the air into the ventricles after injection into the subarachnoid space of the spine. Stereoscopic plates of the head showed that the subarachnoid space in the cervical spine was well injected with air and in this manner the plates showed the spinal cord definitely in the cervical region. This suggested a possible future use for this method in outlining tumors of the spinal cord.

Dr. George E. Pfahler: I think we are very fortunate in having two men who have done such brilliant work present this subject to us. We must keep in mind that both methods are not intended as routine procedures, but to be used to clear up obscure diagnoses when the ordinary methods fail. For instance, in the group of cases shown by Dr. Stewart, probably in one-half of the cases all the lesions could be shown by the ordinary procedures. Dr. Stewart has warned against its use as a routine measure. We can outline the liver and spleen practically always without this method. We cannot show entirely clearly the under border of the liver as we do by this procedure; we cannot study so clearly the upper border and the conditions about the diaphragm. The lesions about the diaphragm capable of being studied by this method are probably the most important group from a therapeutic standpoint with which we have to deal. As the method is developed we shall demonstrate lesions more clearly, particularly of the gall-bladder. The whole matter depends upon getting the part examined into the uppermost field. Naturally gas rises to the top and when we are able to so manipulate the body that the gas is brought between the liver and the kidney and the spinal column without compressing the liver upon these organs we shall demonstrate the gall-bladder much more clearly than today. In examining the pelvic organs we must bring the pelvis up higher than the rest of the abdomen in order to cause the gas to collect about the pelvic organs. I feel that we are only at the beginning of the possibilities of the method. In pyelography I believe the method can be reserved for the exceptional case. Dr. Braasch, of the Mayo Clinic, has written a book on this subject and recently pointed out that the method should not be used as a routine procedure. He cautions against its use in cystic kidney and urges most strongly that the fluid should be taken out by lavage. If this is not possible nephrectomy is advised. I believe the recommendation of studying these cases under the fluoroscope during the injection is of value.

Dr. H. Dachtler: I think with Dr. Pfahler that pneumoperitoneum is a method to be used, not as a routine measure, but for the exceptional case. I can look back over a number of my own cases and know that I would have been able to give more help in diagnosis had I been familiar with this procedure. In this work I am now using the gas anesthesia apparatus for the introduction of the oxygen.

Dr. F. F. Borzell: I have seen one death during preparation for artificial peritoneum in a hospital to which I was attached. The patient was a man of about sixty years of age, who had a definitely splenic leukemia. The surgeon wanted to know whether there were any adhesions to the diaphragm and asked me to make the *x*-ray examination after the artificial pneumoperitoneum. The surgeon was a skilled man and this was his fifth case. Each one of the other four cases seemed to present greater risks than this. Within half a minute after the surgeon inserted the needle the patient developed convulsions, and in spite of all methods of resuscitation, he died within five minutes. We were unable to secure a postmortem, but the accident seemed to be one of those unexplainable accidents such as occur in the course of other procedures. I have not felt at all convinced that the procedure had anything to do with the death.

Dr. David S. Rowen: I have had no opportunity to use the method in my own work. It requires teamwork, men who are interested, working together. Following out the discussion by Dr. Pancoast I have a few slides I should like to show of opaque bodies in the lungs.

Dr. Steward (closing): In 1913 we reported a case of fracture of the skull, in which the cerebral ventricles were outlined with air which had entered through a laceration in the frontal lobe near the frontal sinus. Unfortunately, we did not realize the possibilities of this *x*-ray finding. It was left to Dr. Dandy, of Baltimore, to take the matter up in a practical way and his work has been most remarkable.

One closing word about pneumoperitoneum. We consider it to be a satisfactory and safe method. The main objection met with in New York is that it is a hospital procedure and accommodations are very difficult to obtain; one has to wait one or two weeks. The desirability of making it an office procedure was recognized. The use of carbon dioxid for inflation has accomplished this. The morphin can be given, the peritoneal cavity inflated with carbon dioxid, the *x*-ray examination made and the patient sent home within an hour.

DRAINAGE OF THE BILIARY APPARATUS[1]

By B. B. VINCENT LYON, M.D.

The study I wish to present tonight is an analysis of the diagnosis and treatment by means of a non-surgical plan of biliary drainage of the last 100 consecutive gall-bladder cases observed in private practice. These 100 cases have been studied from 304 tabulated aspects, and, as anybody who has attempted this kind of an analytical study knows, this is a big and tiresome task. Yet I am very glad to have studied these cases in this way, if for no other reason than that it has taught me the errors of commission, but, more importantly, the errors of omission in diagnosis and treatment, the knowledge of which will be of great help in future cases.

I have not written any paper to read to you tonight but will attempt to present extemporaneously the results of this study in very abbreviated form. I hope later to put on record in a more formal way some of the lessons I hope may be learned from this study.

I rather take it for granted that most of you are aware of the inception and development of a new method of more intimately approaching the diagnosis into diseases and disorders of the biliary tract, and that you are now familiar with the possibilities of treating successfully by this non-surgical method of biliary tract drainage many of the earlier and some of the later states of gall-bladder and duct disease. I cannot tonight go into a detailed description of this method, nor shall I speak at length on the rationale of its use. For this I must refer you to papers upon the subject which I have published during the past fourteen months.

[1] Read November 3, 1920.

Merely to refresh your memories let me recall to you that the fundamental basis of this method springs from the discovery of the late Professor Samuel Meltzer, of the Rockefeller Institute, of the fact that a solution of magnesium sulphate when introduced locally into the duodenum will relax the tonus of the duodenal wall and the sphincter (Oddi's muscle) of the common bile duct; and that almost simultaneously with this relaxation the gall-bladder will expel its fluid contents partially or wholly into the duodenum. In previous papers I have pointed out the usual sequence of bile flow from the various components of the biliary system and the method adopted for the recovery of this fluid for chemical, bacteriological and cytological examinations relative to developing a new detailed diagnosis and as a direct check on the progress and efficiency of treatment.

It is now my privilege to come before this meeting and declare more positively my belief that it is now possible by this non-surgical method, to drain the gall-bladder and biliary ducts of its fluid contents within certain limits to which I have called attention in previous papers. In the last of these papers thus far published I summed up the scope of this method as at present developed: (1) as a *means of diagnosis* of biliary disease to supplement the usual clinical methods of diagnosis and the great help given us in many cases by the roentgenologist; (2) as *an alternative method of treatment* of many types of gall-bladder and duct disease in which there arises a question of opinion as to whether surgery is or is not emphatically and immediately indicated; and (3) as *a supplementary method* of postoperatively continuing the surgical principles of drainage in those cases incompletely cured by surgical means alone.

As a result of three and a half years of practical application of this method of diagnosis and treatment of biliary tract disease, in a series of over 300 cases, I can most earnestly express my belief that it is now a proved and rational method in the successful treatment of early cases, and is possessed of great possibilities of future development in the prevention and control of many of the later and more severe states of disease of the biliary tract,

and I trust it may hopefully be extended to certain diseases of the liver, of the pancreas and of some of the more serious of the problem diseases of internal medicine. Future papers will be devoted in part to a discussion of some of the results of an extension of this study into this larger field.

At this time I will not enter into a discussion of the principles and method of draining the gall-bladder except to have you refer briefly to this chart of the biliary system which hangs before you. I believe that the sphincter of Oddi, here, normally, is closed during the interdigestive phase and that it opens in response to the stimulus of food chemistry. Then, according to the law of contrary enervation propounded by Dr. Meltzer, the gall-bladder empties itself partially or wholly of its contents. The volume of bile normally expelled by the gall-bladder most probably depends upon the state and composition of gastric food chemistry reaching the duodenum, if the experiments of Rost are correct. It is by studying the departures from the physiological sequence of events, as seen to follow the local application of magnesium sulphate to the duodenum, as well as by a study of the gross and microscopic appearance and bacteriology of the recovered bile, that we arrive at tentative or definite conclusions relative to the state of the biliary apparatus, both as regards its physiology and pathology.

The first angle from which these cases were studied was that of previous operation. It was found that 35 cases had been abdominally operated on prior to the present study. Of these 12 had undergone gall-bladder surgery and 13 had had appendectomies independent of gall-bladder surgery. After reviewing these postoperative cases of gall-bladder surgery to determine residual infection it was found that positive bacteriology could be demonstrated in the biliary tract in 62 per cent. of the cases in which a cholecystectomy had been done and in 100 per cent. of the cases in which cholecystostomy had been practised. In this small series, then, it would seem that cholecystectomy is the operation of choice, considering only for the moment the question of residual infection. In the cases of cholecystotomy, infection was demonstrated in 100 per cent., and in the cases in which

release of adhesions of the viscus was the only procedure 100 per cent. show still demonstrable infection. From the above it will be seen that surgery in the first place failed in a too large percentage of cases to free the biliary system of infection, and, in the second place, either failed to remove the primary focus causing multiple secondary foci, or failed to recognize the early stages of biliary infection and proceeded to remove the appendiceal one.

The next point considered was the question of attempting to find the primary source of the infection which caused the gall-bladder symptoms. I have felt for a long time that infection in the upper respiratory and digestive tracts is very frequently responsible for many of the acute or chronic conditions in the tract below. The four principal secondary foci are the gall-bladder, the duodenum, the appendix and the sigmoid colon. These may be involved singly, all together or in series, but surgical or medical treatment directed to any one of them will not preclude a recurrence or the later development of trouble at one of the other sites unless the primary source of the infection is eradicated. In the 12 cases previously operated on I was able to demonstrate, by cultural methods, infection still present in 9 cases. In the rest of the series the tonsils alone were found infected in 16 cases.

I will not bother you with figures relative to the associated functional disturbances of the gastro-intestinal tract except to say that in the cases of proved or probable gall-stones 57 per cent. had reduced gastric acidity as against 34 per cent. of cases not showing stones. When the gastric motility varied from normal it tended to hypermotility.

The question of the significance of biliary regurgitation into the stomach is one that has always interested me, and I have come to feel that *frank* biliary regurgitation is evidence of a disturbed physiology of the duodeno-biliary mechanism. In the first place, I believe the sphincter of Oddi should be closed except during the digestive cycle, and, in the second place, that reversed peristalsis should not occur normally in the duodenum, with certain

exceptions not to be discussed here. In this study I found that of the cases with previous gall-bladder surgery 71 per cent. showed fasting biliary regurgitation and 71 per cent. showed digesting biliary regurgitation as against 47 per cent. of fasting and 23 per cent. of digesting regurgitation in the non-operated cases. From this it would seem that operation on the gall-bladder very definitely disturbed the physiology of this segment of the gastro-intestinal tract. In addition, it has been proved experimentally on animals and by clinical experimental study of these postoperative gall-bladder cases that surgery in each instance has destroyed the contrary innervation of the gall-bladder and Oddi's sphincter and has changed the normal physiologically intermittent discharge of bile into the duodenum into a pathologically continuous one, with in many instances harmful results.

As to the associated general symptoms I would say that all these patients presented with gastro-intestinal or biliary tract symptoms. In addition to these localizing symptoms a very large number gave the history of symptoms suggesting focal infection or of auto-intoxication, the most prominent being easy fatigue, drowsiness, nausea, headache and dizziness. The physical findings referable to the upper right quadrant were often meager, but definite tenderness was demonstrated in 46 per cent., spasm in 6 per cent. and rigidity in 22 per cent. There was no instance of palpable gall-bladder in this series. The average duration of ill health of this series of patients was nearly eight years.

Of this whole series positive bacteriology was demonstrated in 93 cases; the material obtained was sterile in 4 cases and no material was obtained in 3 cases. Of the 93 cases with positive bacteriology the streptococcic group was isolated in 50 per cent., staphylococci in 25 per cent., Bacillus coli in 15 per cent., Bacillus subtilis in 8 per cent., Bacillus pyocyaneus in 1 per cent. and Bacillus typhosus in 1 per cent.

To sum up the foregoing, the final diagnoses in these 100 cases, based on a careful analysis of the history, physical examination, various special examinations and the detailed information derived from a diagnostic non-surgical biliary drainage, were divided as

follows: Gall-bladder syndrome, 27 per cent.; gall-stone syndrome, 4 per cent.; mixed syndrome (ulcer, appendix, gall-bladder), 22 per cent.; vague atypical dyspepsia (with or without biliousness), 47 per cent. There was "masked" infection, proved by culture, in 88 per cent. of the cases. If, however, these cases had been studied only by the usual gastro-intestinal methods, supplemented by analysis of the history, physical examination and *x*-ray, but without the added information derived from biliary drainage, only 32 per cent. could have been diagnosed readily as gall-bladder cases. The remaining 68 per cent. were impossible of such diagnosis except by means of direct cytology, bacteriology and chemistry of the bile obtained so easily by this method.

To turn next to the question of treatment, 94 of these cases were treated by me. In all cases but one the chief therapeutic measure consisted in lavage and disinfection of the stomach followed by drainage of the biliary apparatus. The duodenum was then disinfected as a measure of local protection, and a duodenal enema of Ringer's solution was given, reinforced where necessary with sodium sulphate, in order to secure a free fluid evacuation promptly and thus sweep out of the intestinal tract such infected bile as failed of recovery in our bottles. The duodenal enema of 250 c.c. is kept at 103° F., and allowed to drip in slowly in not less than twenty minutes. This whole procedure requires from two to three hours. Colonic irrigations were used in cases where indicated.

As the individual necessities of each case demanded, other indirect therapeutic measures were combined with this direct topical treatment. Medicine was given by oral, subcutaneous, percutaneous and intravenous routes. The only oral medicines used were digestive substitution products and hepatic secretagogues. Electricity, dietetics, glandular therapy, hygiene, psychotherapy, exercise or rest were prescribed in certain cases.

But the first bulwark of treatment was insistence on local topical treatment of the stomach, duodenum, biliary tract and colon. The second agent in which we placed most reliance was

the autogenous vaccine. Especially were these useful when they gave rise to a specific focalizing reaction reproducing one or more of the presenting symptoms, and those cases in which they occurred averaged better in their results. In 58 cases receiving autogenous vaccines there were 17 cases which gave an unsolicited history of focalizing reactions simulating one or more of the chief complaints. Among these gall-bladder pain or soreness was mentioned thirteen times, migraine was mentioned five times. Pain in a tooth socket following a vaccine of streptococci obtained from the gall-bladder and from the apex of the tooth root in one case. Pain in the tonsillar fossæ following a vaccine of streptococci from gall-bladder and tonsil in one case; soreness in the appendiceal region was mentioned once and increased joint involvement in a case presenting arthritis was mentioned once.

Of these 17 cases showing focalizing vaccine reactions 70 per cent showed complete arrest in symptoms as against 64 per cent. for the entire series; 47 per cent. showed complete improvement in findings (as defined later) as against 38 per cent. for the series.

In summarizing the results of treatment by this method, we find complete arrest of symptoms in 73 cases. There was incomplete arrest of symptoms in 17 cases and no relief of symptoms in 4 cases. From the objective side we find that there is complete improvement in findings based on a direct examination of the bile in 47 cases, incomplete improvement in findings in 35 cases and insufficient data on objective findings in 12 cases.

Reviewing the results of treatment we notice a discrepancy in that 64 per cent. of cases showed a complete arrest of symptoms and yet only 47 per cent. showed a complete improvement in findings. This has indicated to us the inadequacy of considering simple arrest of symptoms as the criterion of a cure, and emphasizes the need of continuing the treatment faithfully until the pathological findings disappear, otherwise relapse is extremely likely to occur. Again it is interesting to observe that as treatment is continued the complete improvement in findings runs parallel to the complete arrest of symptoms, and this, and this only, should be made the criterion of a real cure.

As illustrating some of the points in the foregoing analysis I should like to present briefly a few of the cases studied and treated, with a few words of comment.

Miss E. B., aged forty-three years, had severe prostrating migraine cyclic headache for ten years plus. Has tried many things for relief. Absolutely no preceding infections in past life, except a stuffiness and catarrh in left Eustachian tube, which has been under treatment by Dr. Packard. Absolutely normal findings in eyes, nasopharynx, bronchial tree, lungs, heart, kidneys, pelvic organs and gastro-intestinal tract, except for the gall-bladder and constipation (laxative habit for relief of headache).

Headaches: No causative factor, come without warning, two to four days sick headache, prostrating, and when worst accompanied by dry retching and biliary vomiting. Temporary relief by cholagogues. Begins as "thick feeling" in head, then pain first felt over right eye, radiating down temple to mastoid. Soon over left orbital region and radiating to mastoid. (Dr. Packard suggests influence of Arnond's auricular branch of pneumogastric nerve.)

Gall-bladder: Physical findings entirely negative. *But* gall-bladder bile found static, atonic flow, inky black and infected with Streptococcus viridans and Bacillus coli. Heavy viscosity of bile with much exfoliation of gall-bladder and duct epithelium.

Treatment. Biliary drainage twice a week for two weeks, then once a week for a month, then twice a month. Vaccines every five to seven days with focalizing migraine reaction. Pancrobilin for constipation.

Result. Steady progressive improvement; headaches of lighter and lighter severity and of decreasing frequency; general systemic improvement, especially absence of drowsiness.

This case illustrates biliary migraine in its purest form and also the hope of relief which can be offered by this method of treatment.

Mrs. R., aged thirty-three years, was operated eight years ago for empyema of the gall-bladder. No stones. Drainage operation only, but has drained constantly for eight years. Wears a

dressing pad constantly. Was never pain-free for longer than a month; usually attacks every four to twelve days. Began to use a silver catheter for relief of pain. To prevent pain the catheter was introduced into gall-bladder by her husband night and morning. It was noticed that when bile was recovered there was no pain, but when thick white mucus and no bile was recovered a pain attack promptly followed. Another surgeon (who referred the patient to us) had tried for three years to close the sinus by cauterization, but unsuccessfully.

We catheterized the gall-bladder and obtained golden-brown bile with much flocculation, for culture and cytology, and checked it up the next day with duodeno-biliary drainage, with the recovery of the same cytology. Dr. Richardson recovered Streptococcus hemolyticus and Bacillus coli from both sources

Vaccine was prepared and administered and gave rise to focalizing gall-bladder pain. After the third biliary drainage and the third vaccine injection the sinus closed, but two days later an acute attack of pain occurred with moderate fever and leukocytosis. There were no developments after one week's hospital observation and treatment was then resumed on the following basis: Biliary drainage daily for three days, twice a week for four weeks, and then every seven to ten days. She has had no pain for nearly five months, and the sinus has remained closed for six months. There has been marked general systemic improvement with special improvement in color.

This has been a case of greatest interest and instruction to me: (1) Because I was able to obtain bile directly from the gall-bladder for microscopic examination and culturation; (2) because I could obtain the same type of bile with identical cytology and bacteriology by the duodenal route; (3) that the organism isolated and given as a vaccine had definite therapeutic value in eradicating the focus of infection and in promptly closing her sinus.

Miss M. J. N., aged thirty-four years. Six years ago a cholecystostomy was performed with eighteen days' drainage and the removal of a large stone from the cystic duct and many stones from the gall-bladder. The surgeon distinctly remembers the

gall-bladder was thickened and shrunken. The patient remained well for three months, then recrudescence of symptoms, typical gall-bladder syndrome of non-colic type with dull aching from the right costal margin to the shoulder-blade. Nausea ++, anemia + and twenty pounds loss of weight. Our studies showed no difficulty in grouping under the gall-bladder syndrome. There was upper right quadrant tenderness and rigidity. Specific details of drainages were as follows: 90 c.c. to 200 c.c. of static, atonic, green-brown, cloudy bile, emptying intermittently. The bile was infected, the infecting organisms being Streptococcus hemolyticus and Bacillus coli, exfoliative, and contained pus. The common duct was open. Each of six treatments was followed by gall-bladder pain and a vaccine focalizing reaction in the gall-bladder.

Operation was decided on, the points of decision being no relief after a month's vacation and the use of vaccine; the surgeon's belief that the gall-bladder wall must be infected, and that the gall-bladder must be shrunken and thickened beyond its appearance six years earlier. We believed that the gall-bladder must be dilated and distended (*e. g.*, 90 c.c. to 200 c.c. of gall-bladder bile).

Operation. Cholecystectomy. The gall-bladder was found to be distended, with a thinned-out wall, not shrunken or fibrous. Across the fundus of the gall-bladder, along the course of the previous drainage, was a band of adhesions between the fundus and the anterior abdominal wall, anchoring the gall-bladder. Every time the sore gall-bladder tried to contract by itself or by magnesium sulphate it was squeezing against a mechanical difficulty, therefore causing pain.

Postoperative cultures directly from the gall-bladder showed very few Streptococci hemolytici. A section study from the gall-bladder wall failed to show streptococci in the wall.

This case illustrates very well the difficulty in combating well-established infection by either medical or surgical procedures. I would say here that this young lady is not out of danger even now, as I have found streptococci still present in the ducts and

it will only be by persistence in the use of autogenous vaccines and this plan of biliary drainage that I feel hopeful she will eventually win out.

Mrs. E. R., aged forty years. Chief complaint: Pain in right upper abdomen radiating to back.

Family History. Father died of renal disease at age of fifty-three years. Mother died of cancer of the breast at the age of fifty-six years.

Past Medical History. Negative.

Present Illness: Attacks of acute epigastric pain, stabbing and grinding, for six years; vomiting of undigested food, two or three times a week at times, but during the last six months about once a month, radiating around right costal margin. No jaundice, but sallow at times. Frontal headache and at times occipital. Eggs and beef disagree. Easily tired and drowsy most of the time. Bloating relieved by belching and pressure gives slight relief. Pain is mostly nocturnal and unrelieved by food. Vomiting of food as eaten, with bile and mucus. Obstinately constipated. Abdomen diffusely tender at McBurney's point and under right costal margin, but gall-bladder not felt. Mouth negative, except coated tongue. Stomach, acid slow coming in. Total, 65; free, 37, at 105 minutes; occult blood + after sixty minutes; mucus and bile were negative; fasting content, 10 c.c. (green yellow); white blood cells, ++; total, 10; free, 0; occult blood, +.

In two attempted successive biliary drainages the gall-bladder failed to drain in first, and in second only 32 c.c. of dark green turbid bile were recovered. At the same time the patient had an attack of pain similar to the regular attacks. Many crystals were found in the bile, suggesting cholesterol and amorphous bile salts. Cultures: Bacillus coli (heavy); urine, negative; 90 per cent. elimination of phthalein in three hours (80 per cent. in two hours). Blood: hemoglobin, 85 per cent; white blood count, 7100.

Operation early in September, 1920, disclosed a gall-bladder containing thirty-two stones, brown, hard faceted, pea to marble

size. A cholecystostomy only was done. Culture from gall-bladder showed Bacillus coli only.

Postoperative study, November, 1920: Gall-bladder drainage gave 50 c.c. golden brown, viscid bile, flowing intermittently. Some crystals and some amorphous salts. Culture: Bacillus coli.

I am presenting this case to illustrate the point that symptomatic relief is not always a cure. The removal of the stones gave symptomatic relief but the subsequent finding of the same organism and the same inability of the bile to hold its salts in solution is far from a cure of the condition. All the factors that are necessary theoretically for the production of stones are still present and there is no assurance that they will not reform. In this group of cases postoperative biliary drainage by this method from time to time has served to clear up the remaining evidence of disturbed physiological chemistry and bacteriology in a number of cases.

Mr. J. D. E., aged forty-two years. For eight years attacks of pain, distress, gnawing, weight, discomfort and bloating with belching; referred to back when severe; one to three hours p. c. and relieved by eating or vomiting. Always worse when tired, and usually worse in spring of year. (Suggests ulcer history.)

Examination. Asthenic. Blood pressure, systolic, 102; diastolic, 70; pulse, 72. Two dead molars. Gum clean. Tongue clean. Tonsils red and retracted. Heart muscle weak. Abdomen showed no rigidity, tenderness on deep pressure over gall-bladder; and appendiceal pressure gave tenderness referred to epigastrium. Tuning fork suggestion of adhesions of stomach to gall-bladder region. Spinal tenderness, third, to sixth thoracic and tenth thoracic on the left. Hemoglobin, 90 per cent. Findings: Marked catarrhal duodenitis; catarrhal exfoliative cholecystitis with stasis and atony. Green, black bile and culture showed Streptococcus hemolyticus. Upon removal of tonsils culture showed Streptococcus hemolyticus. Vaccines of both were prepared, and have been used alternately, with weekly drainage of gall-bladder. The atony has cleared up, and general systemic improvement has followed. Streptococci are no longer recoverable from the bile by culture nor found in fresh or stained spreads.

The case suggests ulcer based on the history, but biliary drainage proved the gall-bladder to be the seat of trouble, and the subsequent response to treatment confirmed the diagnosis of masked infection of the gall-bladder with complete arrest of presenting symptoms, and final inability to recover the pathogenic infecting organism on repeated culturation.

This case also illustrates a primary focus of infection in the tonsils transplanted to the gall-bladder producing a secondary focus. It should, therefore, be fallacious to attempt to limit treatment to the removal of the latter focus if the primary source of infection is ignored, unsearched for, and if found allowed to remain.

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DISCUSSION

Dr. M. Howard Fussell: Dr. Stengel asked me to discuss Dr. Lyon's paper, and I sincerely wish for two reasons he had asked someone else. I know Dr. Lyon—he is an indefatigable worker, takes extreme care with his work, and he did me the courtesy to ask me to come to his office, telling me of his results. Therefore, I should like to agree with everything he says. I find myself not able to do so, for the reason of the history of gall-bladder disease, and my views of gall-bladder disease at present. He is very positive about the ability to separate the three specimens of bile from the duct, gall-bladder and liver. While he demonstrates a dark bile from the bladder, a lighter one from the liver and a still lighter one from the duct, one wonders whether this represents actually what is present. It may be true, but certainly it is not con-

vincing to me. However, that which disturbs me most in the discussion of this question is the fact that for many years gall-bladder diseases have been wofully mistreated by medical men. We have come finally to think that the dyspepsias, the upper abdominal disturbances in many instances are the real pathology of the bile-duct system. We have learned, fortunately, that in addition to medical means, surgery has absolutely cured the vast majority of cases which we have treated medically. I did not understand until tonight that Dr. Lyon had actually treated fifty-six cases, many of which are actual pathological conditions, with the hope of seeing what would occur. In one of his papers he makes the statement that he presents the method as a means of diagnosis to supplement the usual clinical means and the help given by the roentgenology. If Dr. Lyon by this method can teach us better diagnosis and to distinguish those cases which develop gall-stone empyema and which are surgical, then we should welcome this method. It seems to me, however, that it is premature perhaps, whatever he may do in his own practice, to suggest that we try and see what will come from the medical treatment of these cases which we have known to be surgical and lethal. He says that many of these fifty-six cases have actual organic lesions of the duct, of the gall-bladder and of the duodenum. The great danger is the danger by which all of us were beset, and particularly the medical men, until surgery demonstrated that it could absolutely cure the vast majority of cases. Only last night I saw a case of acute gall-bladder distention, with many stones, which had been treated by the ordinary medical means and had come to empyema of the gall-bladder. I fear if the general public get the idea they can treat these things themselves more harm than good will be done. The subject is still untried. The danger is that of mistaking a real surgical case for one that may be helped by these means. The fact that Dr. Lyon gives five or six cases in the fifty-six which can be entirely cured does not militate against my statement that the vast majority of cases treated by a surgeon are cured.

Dr. Thomas McCrae: I think everyone who has studied this method feels that there is no question but that Dr. Lyon has made an important advance. I do not think that Dr. Lyon meant to suggest that there were not a great many cases of infection of the gall-bladder that demanded operation. When one sees patients who have been treated medically and surgically, both without benefit, markedly improved by Dr. Lyon's method, is it not reasonable to suppose that this same treatment might have done good before operation? The matter of the division of the bile must be more or less theoretical. I think Dr. Lyon has a right to

say that he has a theory which seems satisfactory, and that if anyone has a better one he should bring it out. The method in regard to diagnosis is of the greatest possible value. With reference to treatment we are just beginning to know the possibilities, and it seems they are greater than any of us have thought.

Dr. Lyon (closing): I am glad that Dr. Fussell said just what he did. There should be said a timely word of caution that in our endeavors to try to avoid unnecessay surgery we may swing the pendulum too far, and some patient may be wrongly deprived of very necessary surgery. We must select our cases very carefully. We must learn to differentiate between those that absolutely require surgery, and require it immediately, and those cases which may safely be treated energetically for perhaps six months by this non-surgical, but direct, method in the hope that they may recover without ultimate operation; and between those in whom surgery, or further surgery, is manifestly unwise, and, in the light of our growng knowledge, may leave the patient in a worse state of health.

Above all, we must learn to diagnose our gall-bladder and duodenal lesions early, and to treat them by direct methods of topical treatment instead of wasting valuable months in continuing our former inadequate and unscientific method of prescribing diets and medicines based upon guesswork diagnosis until the inevitable later stages of pathology have developed that ultimately require surgery.

As Dr. McCrae has pointed out, in this new method we have our best chance of making a diagnosis, in the real sense of the word, in the early or presurgical states of disease.

Aside from Dr. Fussell's word of warning, I feel that he has missed the high points of my presentation of this new method. I do not know how many patients Dr. Fussell has treated, or seen treated by this non-surgical plan, but I think one might reasonably gather from his remarks that they were not many, and therefore I feel that he should not condemn any method with which he is not, himself, thoroughly familiar. We who are doing this kind of work daily are much impressed with the manner in which a very large percentage of patients are improving tremendously, or getting entirely well. I should be most happy to have Dr. Fussell, or any other doctor who is interested, and wishes to see for himself, come and inspect our methods.

I feel, too, that we all should take advantage of our opportunities to extend our researches into the physiological chemistry of normal and pathological biles obtained so easily by this method, and that we may reasonably expect by so doing to reach our goal—namely, the prevention

of gall-stones, and cut down the incidence of our more serious states of biliary tract disease. Besides this, an investigation of these biles may teach us much in regard to faulty liver function, and pancreatic function —the precursors of disease of these organs—and may lead to knowledge that we little dream of now.

In conclusion, I feel that I can safely say that my experience of three and a half years with this new method of diagnosing and treating biliary tract and duodenal disease has brought results that have been immeasurably valuable to many patients who have obtained no relief from their symptoms by any other type of medical or surgical treatment.

MEMOIR OF SIR WILLIAM OSLER, BART., M.D., F.R.S.[1]

By THOMAS McCRAE, M.D.

Our history begins long previous to our nativity, and the forbears must be taken into consideration in the story of any life. In this city the elements that had to do with the beginning of the nation are generations back, but in parts of Ontario it is only one or two generations since the days of the first settlers. We cannot estimate, for we have not the experience necessary for it, what it meant to the pioneers who left established surroundings in Great Britain to emigrate to the primitive wilds of Canada. Some of these experiences are preserved in letters and descriptions, but many of them are no more than family traditions, and so doomed to perish before long. We can listen or read, we can think we understand, but actually we only appreciate a small portion of what our ancestors endured. To those brave hearts who ventured all, we can pay only the tribute of appreciation.

It is evident that many of these who venture into unknown lands must be the unusual individuals, moved by a spirit of adventure or a sense of duty. It may have been both in the case of Featherstone Lake Osler, the father of William Osler. Born in Cornwall, he spent some years as an officer in the British Navy. He then decided to enter the Church, and took his degree at Cambridge. Strong pressure was brought to bear on him to go to Canada as a missionary, it being represented that as he had already travelled widely as a naval officer he was the better fitted. Early in his college course he became engaged to Ellen Pickton. They were married in 1837 and soon after sailed for Canada. The missionary

[1] Read March 3, 1920.

was assigned to a district north of Toronto, which was newly settled and where they had to endure hardships and many privations. Their first dwelling was only a shack in the woods.

To the clergyman and his wife nine children were born, William Osler being the sixth son and youngest child. He was born at the rectory of Tecumseth, close to Bond Head, Ontario, in 1849, where the family lived until 1857, when they moved to Dundas. Here his father lived for many years and here the boyhood of the subject of our sketch was passed.

But while life in those early days was primitive in one sense, yet certain influences must not be forgotten. Many of the settlers were graduates of the Universities of England and Scotland, who brought their libraries with them. Many a child in those backwoods received a better education than our schools give today, and while there was plain living there was high thinking. The days were busy for everyone, and even the youngest in the family must have learned the virtue of diligence. If life was simple it was strong, and the enduring virtues were taught by example no less than by precept. To those who knew his father and mother it is easy to realize the influences in the home. His father was the beloved clergyman and his mother a woman honored and loved by all who knew her.

After a man's birth the early influences are the ones that must be reckoned with if we are to understand his development. In the dedication of his *Text-book* you will remember that the first two names are those of Father Johnston, of Weston, and Dr. James Bovell, of Toronto. The Rev. W. A. Johnston, an Anglican clergyman, had a school at Weston, to which William Osler was sent. His influence was great over all his pupils and he was responsible for stimulating the interest of William Osler in science. This was first in the subject of zoölogy, which was aided by the possession of a microscope, not a common thing in those days. This interest in zoölogy continued for many years, and the result is seen in his first paper "On Canadian Diatomaceæ." But it must not be thought that there was no play in his school days. The family tradition has it that he was in more than his share of

mischief. He was active in sports, especially cricket, and led the usual stirring life of a schoolboy at Weston and later at Port Hope. The time came when a decision as to his future career had to be made, and this was that he should enter the Church. With this in view he entered Trinity College in Toronto.

It is surprising how many men who were early destined for the Church have turned to medicine, forsaking the care of the soul for that of the body. William Osler was one of the number, and the definite decision was reached during his first year in his arts' course at Trinity College. Apparently the influence came from two men, Father Johnston and Dr. Bovell. The former regarded him as better fitted for a scientific career than for divinity and, while the church may have lost, the world is the richer for the change. Sir William speaks in one of his essays of Father Johnston having introduced him to the *Religio Medici*, and suggests that this book had some influence in directing his thoughts to medicine. Dr. Bovell had also a strong influence in this decision. He was a physician in Toronto, who frequently spent week-ends at the school at Weston in order to get away from his patients. He was a great friend of Father Johnston, and evidently strongly urged William Osler to enter medicine.[1] At any rate, after one year in the academic side he entered the Toronto School of Medicine in 1868 and spent two years there. At the end of this time he went to McGill to complete his course. He regarded the clinical facilities at that time in Montreal as superior to those of Toronto and the departure of Dr. Bovell from Toronto in 1870 probably had an influence also. Perhaps there was a strain of the peripatetic in him even at that time. In Montreal he came under the influence of Dr. Palmer Howard, the third of his teachers whom he specially reverenced.

After graduation, in 1872, he went abroad for two years, the first fifteen months being spent at University College, London, working especially at physiology and histology with Burdon Sanderson, but

[1] Dr. Bovell evidently had a great influence on William Osler. It was his custom when listening to a discussion or something in which he was not taking part to write "James Bovell" over and over again on any scrap of paper that was to hand. He did this to the end of his life.

doing clinical work as well. This was the usual thing to do at that time among the Canadian graduates who had the means. At this time Jenner, Wilson Fox, Ringer and Bastian were on the clinical staff of University College. Later he went to Berlin and Vienna, where he worked with Frerichs, Ewald, Traube, Hebra and Bamberger.

On his return to Montreal, in 1874, he was appointed to the chair of the Institutes of Medicine, which for the benefit of those who know not the term, included physiology and pathology. The latter appealed to him much more than the former. He used to say that the experiments never would come out properly, and while interested it does not seem that physiology had any great appeal for him. He did general practice when he could be found by his patients. He often told the story of his first fee—fifty cents—for removing a cinder from a man's eye. After four years of work he had saved one thousand dollars, and one of his friends urged him strongly to invest it in Winnipeg real estate. He answered, "No, I am going to invest it in brains," and went to London to take the membership of the College of Physicians and spend some months working in clinical medicine. He worked with Murchison at this time, and his old pupils will remember how often he was quoted. The appointment to the Smallpox Hospital in Montreal and to the staff of the Montreal General Hospital gave him clinical facilities, but perhaps the most important work of this period was done in the postmortem room. The pathological records of the Montreal General Hospital of those days are an indication of his industry and thoroughness. The records are written in his own hand in great detail. The experience gained there was always used. In going over his papers after his death, in the material collected for a paper in 1919, it was found that he had used records of cases seen in Montreal in 1878. Subsequently he taught physical diagnosis and clinical medicine, and in 1884 he spent some months abroad working with Weigert in pathology and with Wagner in clinical medicine. In 1883 he was elected to the Fellowship of the Royal College of Physicians (London) and in 1885 delivered the Goulstonian Lectures on Endocarditis.

Of the sojourn in Philadelphia I need say little. Apparently at this time clinical medicine and pathology were his chief occupations—practice came third so far as the evidence shows. He published several monographs, which have been permanent additions to our knowledge of the subjects of which they treat. When the call to Baltimore came in 1889 there could be no question of his decision, and in that there is no disparagement of Philadelphia, where he had been happy in his work and his friends. The opportunity came and the man was ready for it. Those early days in the Hopkins Hospital saw a state of affairs which can never be repeated. He lived in the hospital and so was able to take an active part in all the work, both in the wards and out-patient department. Soon after going there he wrote the first edition of his *Practice of Medicine*. For some years at the Hopkins there was no undergraduate teaching and all the instruction was given to graduates. It is not necessary to enter into the special points of the Hopkins organization, but the permanent staff with residents who had years of training has always seemed to me one of the most important elements. This took much of the routine off the shoulders of the head and made possible an efficiency otherwise difficult of attainment. In no accomplishment of his life did he take more pride than in his clinic there. The improved methods of medical teaching, the establishment of a great clinic and the training of teachers and investigators he regarded as his greatest achievement.

My first meeting with him was in Baltimore. In those days one Toronto graduate a year usually had the opportunity of an appointment on the House Staff of the Hopkins Hospital. We were given a preliminary canter in the form of a summer in the Garrett Children's Hospital and, if our work was satisfactory, entered the Hopkins Hospital in the autumn. How hard it is, as a rule, to recapture our first impressions; but mine of him are as clear as yesterday. I called on him with letters of introduction and was rather apprehensive about the interview. I had expected to meet a grave professor, but received a slap on the back and a salutation of "Hello, old Canuck." There was never any apprehension after that.

It may be of interest to describe his method of life at that time—say 1896 to 1900. Three forenoons a week were spent at the hospital. He came to the hospital a few minutes before nine and began the ward rounds exactly at nine. As an orderly there used to say, "You could set your watch by him." Two hours were spent in the ward rounds with the fourth-year students, then an hour in the private wards, followed by an hour in a class in the out-patient department with the third year. On another day he gave his weekly clinic and an hour a week with the fourth year in a quiz class. This came to eleven hours of teaching a week. The free mornings were spent in writing. His consultations were in the afternoon, at the office until four or five, with the outside consultations after this. He rarely missed doing some work in the evenings, but he was not a late worker and rarely worked or read much after ten o'clock. He wasted few minutes. In those days in Baltimore he usually came over to the hospital by street car and always had some journals in his pocket to read on the way. He made many notes and usually had a note-book in his pocket. References were often at the tip of his tongue and many a student has been surprised to be told to look up an article in a journal with the year and sometimes the month given. On his summer vacations he usually spent the greater part of the mornings at work.

To his assistants he was the most considerate of chiefs. He never hesitated to let them have responsibility and in the working of the clinic left the administration much in their hands. The relations were most happy—if that is a word which can describe what they were—but it is inadequate. There was no fear of him and no one hesitated to consult him on any question. He could be very diplomatic on such occasions and sometimes seemed to evade giving a decision, leaving that to the man himself. One quality he had which it is difficult to describe, but which Thayer has put excellently, "No one could speak consecutively to him against his will." When tired or with his mind on some other subject it might be quite impossible to make any impression or induce him to make a decision. It was a protective mechanism. It was often very difficult to know his judgment of men, for his

manner was so uniformly kind that he treated all in the same way. But as one grew to know him better it was possible to discover that there were grades of opinions of character. I doubt if many of the men who had earned his disapproval ever knew it. I am sure that all who knew him must have wondered how much of this was natural and how much came by cultivation. My own feeling is that there was much of the former aided by some of the latter. Charity to all men was his daily text—illustrated always by example and only sometimes by precept.

It was always a wonder how he did so much writing. Some of it was done at odd moments but much of it in the free mornings. As a rule he worked over his material very carefully. The first draft of an article often had very few lines unchanged. On his addresses a great deal of time was spent, and that which on delivery came so readily and apparently almost spontaneously was the result of much work. Of the addresses given in this country that on "Science and Immortality" was the one which gave him the greatest concern.

Perhaps some mention of his methods of work may be of interest. He was constantly making notes which dealt with a great variety of subjects. Certain private notebooks were kept more particularly for general and literary subjects, and in some of these there are notes on the same page made in the seventies and in the last year. The subjects of these notes are many. Quotations from the best writers were frequent. It was of great interest to find that on one subject he had notes going back at least to the eighties—the character of the voice. All through his note-books there are comments on this, giving descriptions of varying characteristics of the voice and the influence of residence in different places. When he lived in Philadelphia he made a practice of going to many different churches to study the clerical voice, and had made extensive notes regarding the voices of various clergymen. He had evidently planned an extensive article to be written some day.

From these note-books it seems also that he had planned for many years a book for which he had the suggested title, *The Way of Life*. So far as one could judge the general plan and the chapter headings

were drawn up when he was in Baltimore. Some of the material he used here and there in various addresses. The chapter headings were given. The first chapter dealt with the forbears and the last was headed "In the Hour of Death." We can only regret that this was never completed. It would probably have been an elaboration of his philosophy of life which he has clearly indicated in his essays, but was to have been set forth more fully here.

During his life many thought that he wrote rapidly, and traditions are growing that he wrote this or that address in a few hours. So far as I know there is no basis for any of these stories; on the contrary, he wrote with deliberation and with the greatest pains. Some of his general addresses were written a number of times, bearing out the saying that easy reading means hard writing. The same pains were given to medical papers, in which it might be supposed less care would be required. A striking example of this was found in going over his papers. He delivered an address in 1919 dealing with some phases of acute pulmonic tuberculosis. There were the notes with the various headings which he had used for the delivery of the address and with them three separate drafts of the paper. It might have been thought that with his knowledge of tuberculosis there would not be much difficulty in writing a paper on it, but he had written the paper three times, each differing somewhat in the method of presentation. This was characteristic of his methods. Among the material collected for this paper there were notes of cases seen in Montreal, Philadelphia and Baltimore, with some observed a few months before in Oxford. He used the experience of his life in discussing the problem of today.

In his teaching he had a wealth of illustration and anecdote to illustrate his points, and as for the telling phrase he was a past master in its invention and use. He believed that if a student knew certain diseases thoroughly much would be added unto him, and so each year two acute diseases received special attention, typhoid fever and pneumonia. It was interesting to note how one set of points would be emphasized at one time and another on a subsequent occasion.

He was not fond of matters of routine and administration, and

in the clinic left these very much to his assistants. He himself was conscious of this, and it probably influenced him strongly in refusing the position of president of one great University and principal of another. After having refused one of these offers he said to me, "How long do you think I could have kept my peace of mind, with so much detail and so many problems to settle?" But one offer gave him much concern in the decision regarding it, namely, the call to the chair of medicine at Edinburgh. It came at a time when he was ill and in bed for a few days. At these times he was much depressed, and I have always thought that this influenced his decision in refusing the offer.

But he was not always the man of work, and there was no one with whom it was a greater pleasure to spend a holiday. He played golf for some years, but was particularly fond of swimming. He was a splendid swimmer and a most expert diver. One holiday occasion stands out in my memory particularly. We started out on a pilgrimage to visit Wynford Eagle, the birthplace of Sydenham, and to endeavor to gain some information regarding the birthplace of Glisson. The first day we spent at Dorchester, where we visited the remarkable Roman remains situated near. He was perfectly familiar with the history of the Roman occupation and their methods in making camps. In the wonderful Roman camp we found three shepherd boys playing a game of cards. We joined them and were instructed in the intricacies of the game—calling each other by our first names. In one of his note-books I found a full account of the game, with the names of the boys and of the three sheep dogs. The next day was devoted to Sydenham and Glisson, and was full of details regarding their lives. No one could be a more interesting companion on such an expedition.

No account can be complete without some reference to the humor and love of joking which was so characteristic. It was always coming out. His assistants were a favorite target, and had always to be on the watch for it. Even medical literature was not exempt, as seen in the articles which supposedly came from a practitioner in the Indian village of Chaugnawauga. He used to tell with glee of a review which he wrote of some of his own work, criticising it

unmercifully. His friends were very angry and made strenuous efforts to find out who the offending critic was. Many of his jokes were puzzling to those who did not know the man, but rarely, I believe, did the victim feel any hurt.

On the opposite side to few was it given to know the depth of his feelings. This was brought home to me by the record which was found in one of his note-books of the death of one of the members of his House Staff in the Hopkins Hospital. One of the men on the Medical Staff contracted typhoid fever, from which he died. He came from the West, and for some reason neither of his parents was able to come on to be with him. I remember the occasion very well. Sir William was there when he died. He went home and wrote a description of the scene, with a very tender and touching comment on the death of a son far from his home and with none of his family with him. He was evidently affected by it in a way which none of us who were present at the time suspected. The description might well have applied to the death of his own son. He had a great love for children, to which they were very responsive.

Of his relations to his fellow-men one could say much, but it can be summed up by stating that no one heard him speak unkindly or unfairly of another. He was always ready to make excuses for someone else. He may have had enemies, but I never heard of one. The profession made many demands on his time and goodness of heart. These were often unreasonable, but he never complained. Of certain demands on his sympathy mention should be made. During the war many in this country and Canada sent inquiries to him regarding friends or relatives who were ill or wounded. This was a heavy burden, but he always sent an answer. Whenever possible he saw the patient himself, often after a long journey at much discomfort. This was a very heavy tax on his strength but he never complained. If he could not go himself he tried to have someone else see the patient and report. Much of this was done for people whom he knew very slightly. Most of us would have been impatient but he never was.

Of his achievements in medicine it is not necessary to speak. They are well known to you. The historical sense was strongly

developed in him and he held firmly the view that for the present and future it is necessary to have a firm grip of the past. He was a great admirer of the Greek, and a favorite quotation was: "To one small people it was given to create the principle of Progress. That people was the Greek. Except the blind forces of nature, nothing moves in this world which is not Greek in its origin." His interest in Greek thought and philosophy steadily increased, and at the last he was honored by being elected President of the British Classical Association—a remarkable achievement for a doctor of medicine who had not had a classical training.

Books had been his avocation, and had he lived would probably have been his vocation for the remaining years. Learning and medicine will both be the poorer because he was not spared to complete the *Bibliographical Catalogue* on which he was working. He was no mean scholar, and books represented much to him. The appreciation of his knowledge of and love for books was shown by his having been President of the Bibliographical Society for the last seven years of his life—a period more than twice as long as had been allowed to any of his predecessors. As one of the Governing Body of the Bodleian Library he took the greatest interest in it and was the means of securing many treasures for it.

The question has often been asked as to whether he was appreciated in Great Britain as in this country. The answer must be, "Yes and more so," if this is possible. His activities broadened in his English life. He took a great interest in the University work as a member of the Hebdomadal Council, the Bodleian Library and the Oxford Press. To the medical faculty he proved a stimulating force which has resulted in wonderful development in the scientific work of Oxford University. In the changes which have come about in the medical societies of London he took a leading part. With the profession he took the same place as in this country; he was the friend of everyone. Some years ago I attended a meeting of the Oxford branch of the British Medical Association, and it was very evident what affection the members had for him.

His last illness was long and trying, but he was always patient,

and a whimsical humor was ever in evidence. He predicted the course of events very accurately from the beginning and never accepted the optimistic views of the consultants. One of the books which he had by him in his last illness was a small volume containing the Socratic Dialogues of Plato. He marked it in various places, and it is evident that he had dwelt much on the last one, which you remember deals with the last day of Socrates' life. Among other passages he had marked is this: "The hour of departure has arrived and we go our ways—I to die and you to live. Which is better, God only knows." The passages dealing with the immortality of the soul are also marked, and you will remember that in his essay on "Science and Immortality" he says that he is one of those "who had rather be mistaken with Plato than be in the right with those who deny altogether the life after death."

In the many tributes to his memory we must all have been impressed by the fact that what is dwelt on most is not so much his greatness in the profession as the attributes of the man himself. To those of us who knew him well there was not the thought of his learning and position in medicine and letters, but that he was a friend. Can one sum it up better than by saying—we loved him.

Without any doubt it can be said that his death was a direct result of the war. No one who did not see it can realize the extent of his activities. The death of his son came as a heavy blow from which, in one sense, he never recovered. But he went on doing the day's work, although much of the savor of life had gone. The sorrows of others were a heavy burden, and I was impressed by what some of his friends told me of his grief when they lost loved ones. He felt the sorrows as common to all.

Many of you will remember that over the fireplace in his library were three portraits, of Linacre, Harvey and Sydenham. He combined qualities of all three—the learning of the first, the inquiring spirit of the second and the clinical acumen of the third. For him medicine was not of today only but the sum of all that had gone before. He had the historical sense from the lack of which so many of us suffer and know it not. One may ask from what came the power which he had to bind so many to him in love and friend-

ship. Giving of his best and asking nothing in return, all was given him. Believing the best of all men, it was given back in kind. His last published writing, done during his illness, was a review of the life of Victor Horsley by Stephen Paget. He closes the review with these lines from Shelley:

> He is secure, and now can never mourn
> A heart grown cold, a head grown gray in vain.

SIR WILLIAM OSLER AS A CLINICIAN AND TEACHER[1]

By HOBART AMORY HARE, M.D.

The President of this College has asked me to speak tonight of Osler as a Clinician and Teacher. This is a theme that might well be divided among several Fellows, each of whom could readily find material for a long contribution to the proceedings, for Osler did not teach medicine alone even in all its parts. He taught medical men to love the literature of the profession as well as the highest type of general literature, and so he taught us culture, and that the wearied mind could find comfort, sustenance and inspiration in paths wherein we had not trod in this workaday world. His love of the Fathers in Medicine served to teach us that we should learn what they did before we boast of what we do, and his unusual knowledge of classical literature was utilized to charm us as we labored. Always faithful to the cause to which he had devoted his life, he never left it so far from his reach that one forgot he was a doctor of physic, but he led us from the dry fields of exact science, when the spirit moved him, into the tropical verdure of cognate things, now touching the humanities, as in Aequaenimitas, now placing before us a mental feast that satisfied the soul and made us better men.

Partly because the topic is too great and wide and partly because others have spoken, or will speak, of Osler in Toronto, in Montreal, in Baltimore and in London, I shall deal with him as a clinician and teacher in Philadelphia, and this is more proper because it was here that he fully developed, or at least where his development had an opportunity to expand. Teaching the so-called Institutes

[1] Read March 3, 1920.

of Medicine in Montreal, he was nevertheless a bedside clinician. Here his knowledge of the "institutes" formed a foundation on which we saw him place his early superstructure, here his house was completed, and in it he stored his Lares and Penates in the form of the friendship of great men, a large hospital experience and special training as a teacher at the bedside. It may be truly said that Osler's career in Philadelphia was the period of his full development. When he went to Baltimore he was complete, and Johns Hopkins Hospital and Medical School got the benefit of his full growth.

I do not speak of William Osler as clinician and teacher because I had the privilege of sitting at his feet as an undergraduate pupil. He came to Philadelphia in the fall of 1884, the year of my graduation, and his arrival created the keenest interest among all medical men hereabouts because he was, to use a political phrase, "a dark horse." Alfred Stillé had offered his resignation from the chair of Practice of Medicine in the University of Pennsylvania in 1879, and had been persuaded much against his will to continue another five years.

As the year 1884 began it became evident that the then professor of clinical medicine, William Pepper, 2d, would succeed Stillé, and a lively canvass on the part of several junior teachers was begun for Pepper's place. One of these is now dead, the other, who long since retired from practice, led the van of candidates, and it was generally agreed, among the youngsters at least, that the senior of the two was slated for the place. In the meantime, however, the late Horatio C. Wood visited Montreal, heard of William Osler as a teacher and investigator, and meeting him fell a willing victim to his charm. He at once returned to this city filled with unbounded enthusiasm for Osler, and although he was anything but a diplomatist, his forceful presentation of Osler's qualifications, combined with the praises of the Canadian's qualities which came from every source when inquiry was made, resulted in Osler's election. And it may be truly said that never in its history did the University act so wisely. Indeed, it acted more wisely than Osler's most warm admirers dreamt of.

To understand this it is necessary to recall certain facts which antedate the time of Osler's arrival. He came to Philadelphia when medical education was undergoing more radical changes than ever before or since. The three-year course had only recently become obligatory in a few schools, of which the University was one, and the class of 1884 when it entered in 1881 was the first one required to pass an entrance examination if its would-be members did not possess high-school or college credentials. For some years prior to that time the Faculty had been divided as to the wisdom of these and other changes, the older members, such as Stillé, Penrose and Leidy, being loath to change old customs, and the younger men, such as Pepper, Wood and Tyson, being convinced that it was essential, with the result that to some extent the medical school was a house divided against itself.

Another source of irritation was the fact that the College Department being very small in the number of its students and the medical school very large, the latter was not only a dominant factor as to numbers but as to revenue as well, with the result that the salaries of the medical professors were large and those of the college professors small. On the advent of Pepper as Provost, he seeing the University as a whole arranged that the medical school should part with some of its large earnings for the support of the college. This greatly disturbed the whole medical faculty, that is both factions, as it was feared that what with a small class due to a three-year course, and entrance requirements, and a percentage of earnings deducted for the college, there would be little left for the medical teachers at a time when more income than ever was needed to expand the novel ideas in medical education.

There were practically no laboratories, except that of chemistry, as we know that term today, and a few ward classes. The faculty was perhaps the strongest that the University has ever known, but while Agnew, Ashhurst, Goodell, Wood and Stillé were each *facile princeps* in their departments, some of the other chairs were, by force of circumstances, filled by men whose chief ambition and ability were along quite different lines. Harrison Allen, who was a learned comparative anatomist, lectured on physiology and

practised laryngology for a living; Leidy, with transcendent abilities in every branch of natural history, had to teach ordinary anatomy; and Tyson, who in turn had taught physiology, microscopy and urinalysis, although an active clinician, was professor of pathology.

That these men taught well and faithfully goes without saying, but none of them had a chance to do anything in the line in which they loved to labor. In other words, the oldest and best medical school in the country had reached a curious state of what may be given the paradoxical term, "seething inertia." There were many professional, financial, educational and developmental problems to be solved. The older men felt that they were being crowded out by the younger men, and the younger men felt that they were crusaders for the right.

This aspect of affairs might be discussed further, but what I have said suffices to show that Osler came to Philadelphia at a time when many a man would have proved a misfit even if possessed of brilliant parts. His arrival spelt the doom of the ambitions of a number of medical clinicians by no means unworthy; it meant that Pepper with all his brilliancy was to find a foeman worthy of his steel in the faculty and as a teacher, and that the element that was for great changes in teaching was fortified.

The remarkable part of Osler's entrance was that while the report of his election raised waves of regret and indignation, his actual plunge in the pond at once had the effect of making its surface placid, and this without there being any manifest effort on his part to ingratiate himself with any one or all of the factions. He entered so gracefully and ably and so naturally that he seemed almost at once to be one of us, young and old. He was gracious to his elders, cordial to his contemporaries, encouraging to his juniors and jovial almost to the point of frivolity with all but the dominant factor that made his way successful with all hands, was, to use a student phrase, "he was up"—that is, he knew his subject and knew how to teach what he knew, and no one knew a subject better than he did when a show-down of knowledge was to be made. He took an active part not only in University matters but in all the medical

societies that tended to research, and he never spoke without impressing his hearers with his familiarity with his topic. All these facts explain how it was that he won his way so rapidly with the medical men associated with him as well as with the students.

He had on his arrival one handicap that in a strong man meant little, but in a weak man would have been fatal to a lecturer, namely, a halting English speech or mannerism which he later largely lost. I well recall his first clinic in the University Hospital six months after I graduated. His patient was a man with a retroperitoneal sarcoma—"Lobstein's sarcoma" I remember he called it—and every sentence began with a very English "Ah!" As the class were accustomed to the fluency of Pepper, Wood, Goodell and Agnew, this lecture seemed stumbling, and certainly Osler was not playing for popularity among the students when he chose a rare and relatively uninteresting topic for his first discourse.

His first ward class was an eye-opener. In it he fairly frolicked in enthusiastic delight, and in a few moments had every man intensely interested and avid for more. Every new specimen that he came to at autopsy, and every interesting manifestation of disease in the living, was to him a treasure, and just as Leidy saw in every flower and stone and bone and worm and rhizopod an inner beauty, so Osler, to change my metaphor, was as the light-hearted child who finding a field of daisies shouts his delight so exultingly that all the other children become interested and gleefully shout with him.

Osler did more than any other man of his day in this city to teach all men that disease is not a horrid thing that some people, called medical men, have to study to earn a living, but a pursuit which a properly trained mind can follow with as keen enjoyment and uplift as an artist can study great pictures or a musician can hear great masters. Before Osler came the student was prone to regard a cancer as a cancer; when Osler left the student studied it as an aggregation of cells possessing untold mysteries to be unravelled, and this is the more remarkable because while he went

into the postmortem room with the joyous demeanor of the youthful Sophocles leading the chorus of victory after the battle of Salamis, he cared little, and admitted he knew less, as to how the victory could perhaps have been reached by proper treatment before death took place. This lack of interest in therapy may be said to have been the one weak spot in Osler's otherwsie perfectly rounded-out medical qualities. He joyously quoted the remark of a colleague that "Osler's therapy consisted in Hope and nux vomica."

Referring once more to the period at which Osler came here, let me point out that any attempt at original study or research was almost unknown, at least among the younger men. The transitional epoch from the old methods of purely didactic teaching of two years to the laboratory method of today was at its very beginning, and even if a youngster possessed the investigative spirit no facilities were offered by which that spirit could be developed unless he had the means and the will to develop a laboratory of his own. Osler's enthusiasm soon made an opening, and almost within a month of his arrival he had rigged up a small clinical laboratory, under a part of the hospital amphitheater, and there, amid surroundings so discouraging as to foil the novice, he produced an atmosphere so encouraging and helpful that young fellows trooped to his side. It was as if Beethoven were playing in a hovel. What mattered it if the master played, in each case the physical surroundings served only to emphasize the brilliancy of the central figure. And so it may be said that Osler on entering Philadelphia carried the torch of original research in clinical medicine, and every now and again touched unlit torches that only needed his hand to make them burn, torches which have happily been carried into many distant parts, each lighting other torches, until like sacred flames that never die, but multiply, a multitude now exist, some of which are known as torches which he lit, and others, though burning brightly, wot not the source of their living fire.

It is a characteristic of those who love medicine, or any other branch of science, that they delight in teaching others with ease

what they have learned by labor. Those of us who knew Leidy recall with what pleasure he would instruct us about some theme that he was familiar with. He seemed to get the same enjoyment out of it that a young father takes in teaching his infant son how to walk. And so did Osler. Indeed it may be said that in their walks of life most of those who were capable of learning can still be recognized by their Oslerial gait—not as to their legs but in their mental progress. Osler, therefore, developed the creed of original study not only here but everywhere where his apostles migrated. He found a field fertile but unsown, and he raised a harvest that not only reseeds itself here but with each additional year scatters its grain in ever-widening fertile fields. Indeed, it may be said that it has long since ceased to be a matter of seeding but rather one of catalysis. Even though he is gone, the living particles of enthusiasm are converting many a low metal into a true gold.

No man whose metal was not pewter did not become the brighter for his Midas touch. Further than this, if he did not brighten as rapidly as the rest Osler did not cast him aside as tiresome or worthless. On the contrary, to change my metaphor, he was often interested in the pathological state of mind that seemed refractory, and by interest or judgment he soon found where the shell was thin and opened him up, as much to the surprise of others as to the student, whereupon he helped the youngster find himself. With some he used firmness, with others cajolery, with still others he feigned annoyance, and, last of all, with some by an affectionate regard, because deep in the man's soul Osler was the first to see lovable qualities.

A very remarkable fact is that whatever Osler did he never lacked an inner dignity that even the most frivolous conduct could efface. I well remember on one occasion dining with Osler and his wife while they lived in Baltimore. The other guest was an eminent French clinician whose knowledge of English was scanty. Toward the end of the meal a servant handed Osler a package. It came from a grateful patient and was, if I recall correctly, a very ancient copy of Bunyan's *Pilgrim's Progress*. Osler no sooner

saw what it was than he uttered a cry of delight, and jumping from his seat at the table ran about the first floor of the house like a schoolboy of ten years. I shall never forget the expression of that Frenchman, and I confess that for a moment I thought my host had lost his mind. In a moment he was the every-day Osler we all knew, and was telling his guests, with particular pains to make his chief guest grasp his meaning, what a treasure had come to him.

On still another occasion, in Washington, during the first meeting of the Association of American Physicians, with headquarters at Wormley's Hotel, I was asked by a reporter to tell him about the great men in attendance. I was there only as a medical youngster and referred him to Osler. Osler took him to the breakfast-room door. In a far-off corner sat a distant relative of mine, Dr. Francis Delafield, a great consultant in New York, and by no means jovial or frivolous. The reporter was told that this somewhat aged man was devoted to baseball as a player, that he could not find time to play with regular teams, so he got groups of street urchins to play the game with him on vacant lots, and all of this appeared in cold type the next morning. Delafield was not pleased. I never knew if he knew who was the guilty one, but I do know that in later years he was one of Osler's warmest friends and admirers.

It may be asked, Why when discussing Osler as a clinician and teacher do you bring in these outbursts of youth? I have brought them in because they serve to show a buoyancy of spirit that could not be submerged. Such outbursts by an ordinary man would be splashes of mud on a blank canvas. With Osler they were the dashes of scarlet by which the great artist suddenly changes a dark picture into a glowing fire of sunshine. Combined with his other qualities they served to tell every man that he possessed all good human attributes. Unconsciously we learned that enthusiasm could be controlled by judgment, light-heartedness by thought, buoyancy by ballast, and last of all grief by serenity and the thought of others.

It is not out of place, Mr. President, that this the oldest medical body on this continent shall set aside an evening when the sterling qualities of one of its Fellows is considered. For Osler went about

doing good; he taught us, as Robert Louis Stevenson said, that "It is better to travel happily than to arrive," and although absent from our halls these many years it may be truly said that his spirit never left us, and that while we live, and this College lives, it will continue to exert upon the whole of American medicine a goodly influence.

Those of us who knew Osler well still feel the glow of his personality, and those that did not nevertheless bask in that same sunshine, the sunshine of high ideals, of noble thoughts, of gentleness and kindness, of firmness for the right, of love of one's fellowmen, and, not least, the love of that profession of medicine which he so gracefully adorned and at whose shrine he placed his noble qualities and his faithful service.

When the most cruel blow to mortal man was given him in the death of his only son in the war, he taught us that to be brave when bravery seems impossible is true courage. When stricken himself by the Captain of the Men of Death, as he called pneumonia, he still sent across the sea his Christmas message of good cheer but four days before he died from a hemorrhage complicating an empyema. He taught us in life to be glad, in sorrow to be brave, and he left behind him what few men leave—the happiness of a great friendship, the exultation of a great spirit and the stimulus of a noble life. To quote Kipling's verse:

"He scarce had need to doff his pride
Or slough the dross of earth
E'en as he trod that day to God.
So walked he from his birth,
In happiness and gentleness,
In honor and clean mirth."

SIR WILLIAM OSLER AS A MAN OF LETTERS[1]

By CHARLES W. BURR, M.D.

There are men of talent who do the one work in life they are peculiarly fitted for and nothing more. In all else they are like us ordinary mortals. There are others for whom work along one line, of one kind, is not enough. They have such wide interests, such capacity for intellectual labor, such a large mental outlook, live in such a rich intellectual world, that they are compelled to do serious work in several fields. Others can do one kind of important work well, but must also have some other intellectual pleasure. Such men seek avocations as well as vocations. An avocation is a glorified hobby. Just as small souls collect postage stamps, or play chess, or golf, or do some other harmless thing, so certain greater souls must rest their minds, not by idleness and sleep as does the dog, or by impish play like our distant cousin the monkey, but by some pleasant and, at the same time, useful productive work. The pursuit of letters is such an avocation, and one that appealed strongly to Sir William Osler as it has appealed to so many physicians. I say has appealed, because there is a justified fear that the newer methods of education which certain philosophers of the meaner sort are trying to force on the coming generation and our worship of specialism, not only in medicine but in all kinds of work, will end in breeding men who will have little interest in, or pleasure from, pure scholarship for its own sake. The movement is not a permanent one but will do much injury for many years. Osler was out of sympathy with any such method of improving the race; he belonged to a world that

[1] Read March 3, 1920.

is dead or rather in eclipse. He, as a boy, lived in an old-fashioned, intellectual atmosphere; his mind was fed not on mental pap but on real literature. His early taste was not spoilt by the worthless stuff sent out by the printing presses of today, in such huge quantities that real literature is smothered. In his boyhood the making of books was expensive: wood pulp and multiplex printing presses were not yet invented. The book trade catered to the full-grown intellect. Much that was printed was dull, stupid and soon found its proper place, but much was scholarly, and, not a little, good, strong meat for full-grown men. The paranoiac, whom we have always with us, had to have a well-lined pocket-book to get his crazy panaceas for social and political evils printed. He was not welcomed in the Sunday supplement and the uplift magazines because they had not been imposed on a much suffering people. The Bible was still a living book; the subjunctive mood had not gone out of existence; sentences did not have to be reduced to the length of a clause, lest the reader should have brain-fag, and colons and semi-colons were still in common use. Punctuation was a well-known art. People either read or did not read, and if they read they read and studied things worth the reading. They did not disdain to reread and got on friendly, or it might be very unfriendly, terms with an author, but they at least knew his works.

More important, he belonged to a generation which followed the old tradition, that the physician ought to be a scholar, first broken away from by Germany and, later, following Germany's example, by us. Today we have wandered far from tradition, and under the pernicious influence of so-called efficiency are trying the experiment of vocational training. Theoretical pedagogues of the newer school, pretending they have discovered a new psychology, teach us that to be efficient the boy must, from a very early time, learn only the things useful in his future work. The disciples of efficiency do not realize that the one thing we need is well-grown, well-rounded-out men. Osler grew up in an atmosphere of real efficiency, an atmosphere which made men able to get all out of life that life has to give, and hence able to give back abundantly.

Environment reinforced his strong hereditary bent toward appre-

ciation of letters and, in addition to appreciation, he had the impulse to accomplish. The two do not always go together: ability to enjoy is much more common than ability to create. Indeed, sometimes among men whose trade is writing there is a curious lack of appreciation, of power to appreciate, at least the work of others. But this is a human failing having deep-seated causes. Writing with him was not a trade, not a thing done for money or fame, but for very joy in the doing, his pleasure, his rest from serious work. Another motive was that he realized well his peculiarly powerful personal influence on students, and, as he firmly felt the need of scholarliness in physicians, in order that they should have such a grasp on all culture that they would see nature as a whole, and see the real relations between things which to the vulgar mind seem to have nothing in common, he strove in his non-medical essays to stimulate an appetite for the study of biography and history, the keys which open the lock of philosophy. He handed on the torch to sympathetic hands; that was easy enough; but more than that, he made kinetic, potential tendencies in many a young man who might otherwise never have been stimulated in the right way. He knew full well that to understand the medicine of today one must know the medicine of the past, and many of his essays deal with that subject. He was consciously or unconsciously ever fighting the pernicious German intellectual influence in medicine which has done so much harm in America. I mean the idea that advance comes from each man taking up some one little subject and studying that thoroughly. Now there is good in this, just as there is good in a method of modern industrial life whereby a man in, say shoemaking, is taught to do some one little thing until he becomes almost as automatic as the machine itself. The good is that shoes are cheaper, more people can therefore buy them than in the old days; the evil is the shoemaker is not a man but a cog. Further, no such workman will be able to see shoes in relation to the universe and invent some better foot-covering. So in medicine the research workers by the German system rarely make great discoveries, and as men they will insofar be failures in that they will not get all that is possible out of life. One reason why modern Germany has made relatively so few great

fundamental discoveries in science, why it has had so few stars of the first magnitude, while having made so many little discoveries, having so many minor stars, is this very thing, that the Germans have carried specialism so far that each man's mental life is passed in a world too small for him to see the great universe.

Wide as were Osler's intellectual interests, many of his friends were astonished at his acceptance of the invitation to deliver the Ingersoll lecture on "The Immortality of Man." He declined once, but when a second invitation came he felt he could not again refuse, the more especially because President Eliot told him others of his profession had also declined. The inference seems to be that a refusal to lecture on the subject might strengthen the popular opinion that where there are four physicians there are three atheists. There is no need to say that Osler's philosophy did not agree with the saying. In a private letter to a friend he classed himself as a subconscious Teresian. What that is everybody who has studied the history of religion knows, and those who have not manifest a lack of interest in the matter of which they need not be proud. He chose for his title "Science and Immortality." In the lecture he frankly confesses science cannot help in deciding the question as to whether there is personal survival after death, points out that whole races have played their part and come and gone and been careless of immortality, that even today, though a small number of people live this life as a preparation for the life to come, the majority are in no way influenced in conduct or in thought by what the future may be. His own feeling is that "to keep his mind sweet the modern scientific man should be saturated with the Bible and Plato, with Homer, Shakespeare and Milton: to see life through their eyes may enable him to strike a balance between the rational and the emotional, which is the most serious difficulty of the intellectual life." This is good advice, but whether it is followed will depend primarily on a man's protoplasmic make-up and in less degree on his childhood's nurture. Intellectual affinity is quite as real as chemical, nor more nor less mysterious, and how Smith or Jones or Robinson will react to Plato or Milton or any other mind, whether there will be any reaction, or if any what, depends on things we know nothing of and certainly have no control over.

Osler showed his zest for letters and his ability therein even in his purely medical writing. This is nowhere better shown than in his paper on "The Treatment of Disease," written for the *The Oxford Medicine.* Written when he was no longer young, I think it was among the last things he did, it is his apologia for his therapeutic methods. You all know, of course, that the therapeutically credulous, the lovers of every new drug, the worshippers at the shrine of the idol medication, called him a therapeutic nihilist, and not always in language to be used by tongues polite. They have not, and will not, enjoy this essay, especially as there is an undertone running through the whole indicating that polypharmacists may not know quite as much as they imagine. His emphasis on the fact that the starting-point of all treatment is a thorough knowledge of the natural history of disease is not pleasant reading to the gentlemen who much prefer to spin cobwebs of therapeutic method, out of a thread of dream physiology, spun with busy pens on paper at a writing desk.

Most of Osler's essays had some relation to medicine. He was from early manhood particularly interested in biography. One whole volume entitled *An Alabama Student and Other Biographic Essays* contains only biography. But he was interested in these men not only as physicians but as men, and especially as men who conquered obstacles—men who by sheer effort of mind had done things and thought things others better placed, sometimes, had neither done nor thought. His social instinct was so great that he was not content to have many living friends scattered over the whole world, but was compelled to hunt up all the dead worthies who had done things and been forgotten. In friendship he resurrected them that they might have more friends.

He was strongly influenced by Greek thought. He was so profoundly Platonic that more than once in writing, and many, many times in common talk, he said he would rather be wrong with Plato than right with anybody else. His worship of Greek philosophy pervaded him: it influenced him in many ways: even in his strictly scientific writing now and again a reference to Plato appears. As I know no Latin and less Greek, and can make no claim to any deep knowledge even of Jowett, but am a sort of barbarian (in the

older sense) who has read a little philosophy, mainly to be astonished to find how modern, how familiar much of it seems, I am entirely incompetent to speak on matters with which Osler was familiar. I am somewhat like the woman who was astonished at the number of quotations Shakespeare used in Hamlet. I can only say that it might be useful to the world-rescuers of the newest school, who, as I understand, would abolish the study of history, since our problems are all new, and the study of ancient philosophy and science because those old thinkers are behind the times, to read, learn and inwardly digest what Plato has to say about education and not a few other things. I am sure if they have as open minds as they boast of having they would come away from such reading with a feeling of humility such as they have never had before. A few of them might even stop teaching in order to learn something themselves. Osler's interest in Plato and things platonic led to an honor which I think had never come to any other physician, the presidency of the British Classical Association, at the meeting of which in May, 1919, he delivered the presidential address. His subject was "The Old Humanities and the New Science." The address is characteristic. It shows here and there his sly and sometime impish wit, his unexpected references to out-of-the-way characters in books, once popular but now forgotten, or reigning among the immortals in name only, having ghostly immortality, and finally his wisdom. He holds the balance true between science and the humanities and maintains what will ever be true, that the educated man needs both or he is not an educated man. The circumstances of the writing of this address impressed me tremendously. Written at an age later than that at which most men cease to think, and, if surviving in this world, are often in a sense mere automata, living in an intellectual past, the gates of the brain tight shut against the entrance of any new idea, no matter how strong the battle without and how great an effort is made to compel entrance, with emotions deadened, not, as the poets say, by increased wisdom but because the life-carrying stream passes more sluggishly over the cells which, in some mysterious way, secrete thought and bathes them in a fluid less rich in the hormones carried from distant organs, and because the sewers of the body are

clogged, it shows no sign of age. Remember, too, its author had lived through four long years of war, had seen his country wracked and driven almost beyond endurance, and finally had suffered the sacrifice of his only son and child. The man who could endure all this and yet make such an address needs no argument to prove his worth.

Osler made no pretence to being a great light in literature; none of his essays will give him a living immortality; they will of necessity soon be put on the upper shelves in the store rooms of libraries and only be read by medical antiquarians hunting up the lives of old worthies, just as he shook the dust from many an old volume written by men one time great and resurrected only because he had a mind curious to know the steps that led to the growth of science and of medicine. But the influence his essays have had on the men of the days of his teaching will be a never-dying force for good. Just as there is an immortality of matter carried from generation to generation, so there is an immortality of thought passed on from teacher to student. Few men have chosen their hobbies so wisely as he. He helped others in getting his own greatest pleasures.

SIR WILLIAM OSLER AND THE LIBRARY OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA[1]

By FRANCIS R. PACKARD, M.D.

Osler's love of books and his appreciation of their value so permeates his own writings that it is almost superfluous to quote any of his special allusions to them, but his golden sayings are so apt that I am sure I will be pardoned if I preface my remarks on his special relations to our Library by a brief reference to his views on the subject in general.

In his address at the opening of the new building of the Boston Medical Library, in 1901,[2] he said: "It is hard for me to speak of the value of libraries in terms which would not seem exaggerated. Books have been my delight these thirty years, and from them I have received incalculable benefits. To study the phenomena of disease without books is to sail on an uncharted sea, while to study books without patients is not to go to sea at all." This seems to me the keynote of all Osler's writing and teaching. In everything which he did he sought to make the members of his profession realize the importance of the cultivation of the intellectual side of their art, but always with due appreciation of the necessity for its practical application. In his presidential address before the Association of Medical Librarians, in 1902,[3] Osler gave at length his views as to the way in which a library of American medical books should be constituted, and in reading it over one is forcibly

[1] Read March 3, 1920.

[2] Subsequently published under the title "Books and Men," in Aequanimitas.

[3] Published with the title "Some Aspects of American Medical Bibliography" in Aequanimitas.

impressed with the manner in which the literary element is made to subserve the practical.

Osler's gifts to our library were numerous and valuable, including one very valuable addition to our incunabula, the *Astronomici veteres*, published by Aldus at Venice in 1499. He was also one of the group of Fellows of the College who subscribed together and purchased the first printed edition of the works of Celsus, published at Florence in 1478, and presented it to the College. Many other rare books were donated by him personally to us, but the greatest service he rendered to the College was the vigilance with which he watched for anything which he thought might be of value to our Library and put us on the track of obtaining it. Our Librarian, Mr. C. P. Fisher, has preserved a series of notes and letters written to him by Osler on the affairs of the Library. They are a remarkable monument to his unflagging interest in its welfare. In almost every letter he asks whether the College has some rare or interesting book of which he has found a copy in the course of his prowlings in old bookshops or frequenting of auction rooms. The books he writes of vary from incunabula to a collection of broadsides and pamphlets on the Siamese Twins, which he thinks the College should have because of the postmortem association of the Siamese Twins with the Mütter Museum. In another letter he writes that he is sending the Library a pamphlet by Priestley, adding, "The College should collect the Priestley pamphlets not only for their intrinsic worth but from his association with Pennsylvania." In the same letter he asks, evidently intending to send them to the College if the answer should be in the negative, whether the Library contains Glisson's *Tractatus de Ventriculo*, 1678, and Bishop Berkeley's *Siris: A Chain of Philosophical Reflections and Enquiries Concerning the Virtues of Tar Water*, 1744; adding, "It is one of his most famous philosophical works, and the starting-point of the widespread use of tar water as a remedy throughout Europe." In another he writes offering the Library a copy of Dodonaeus's *Medicinalium Observationum*, published in 1521, directing attention to its importance "as one of the first collections of postmortems. Of course, Dodonaeus is always interesting."

Another time he writes on a postcard just the following lines: "Have you Sydenham's *Observationes Medicæ*, 1676? I picked up an extra copy. It is one of the rare original editions. Wm. O."

The last communication which Mr. Fisher received from him was written during what was to prove his last illness, on November 20, 1919. Our Librarian had just published in the *Annals of Medical History* a list of the incunabula in our Library. It is a short note written entirely in his own hand and I will transcribe it in full as a last instance of his thoughtful interest in our welfare: "So nice to see such a fine incunabula list. You have grown and there are some beauties. I run to about 150, and some are gems. I have been laid up for six weeks and still in bed; a very protracted influenza; better now. Love to the Library Committee. Do you know that I only heard of Dr. Henry's death the other day. Dear man!" W. O.

To those "Sons of Belial," as he would have termed them, who grudge the expenditure of money in the acquisition of incunabula or other ancient books for a medical library, and consider the space they occupy on the shelves would be better employed if filled with the ephemeral publications of the day, we can only offer the advice that they read Osler's own writings in order to see of how much practical usefulness such venerable tomes are.

He not only had the bibliophile's passion for rare or beautiful books, but he had the practical physician and teacher's appreciation of their proper use as tools. In his letters about books which he was anxious our Library should possess it is noticeable that he always refers to some reason why the book would be useful to our Fellows. He does not advocate the purchase of a book, nor send one to us as a gift without a brief statement of the reason why, in his opinion, the book would be useful. He had himself a very large and valuable collection of medical incunabula, and he knew them from cover to cover. His knowledge of the old medical authors was unsurpassed, but his was no mere antiquarian's or collector's lore. He familiarized himself with them in order to better approach the medical problems of the day. He said: "By the historical method alone can many problems in medicine be approached

profitably. For example, the student who dates his knowledge of tuberculosis from Koch may have a very correct, but he has a very incomplete appreciation of the subject. Within a quarter of a century our libraries will have certain alcoves devoted to the historical consideration of the great diseases, which will give to the student that mental perspective which is so valuable an equipment in life."

To Osler's influence more than any other one cause is due the great awakening in interest in the study of medical history and the consequent increase in the breadth of view of the profession. Although Osler was preëminently successful as a practising physician and teacher, nevertheless the scholarly bias of his mind was ever uppermost in his daily intercourse with his associates and in his writings. To his inspiration is largely due the greatness of our Library and the symmetry with which it is proportioned to meet the needs of all who use it. Let us feel a just elation in our wonderfully complete files of current periodicals and in our acquisition of all the most recent publications; but we should also realize the value from every point of view in our collection of old authors, and especially in our splendid group of medical incunabula, only excelled in this country by that of the Library of the Surgeon-General, and let us render due and reverential homage to the wisdom and generosity of the great physician of our time to whose counsel and aid so much of the success of our Library is due.

SIR WILLIAM OSLER AS HOST TO AMERICANS IN ENGLAND DURING THE WAR[1]

By GEORGE WILLIAM NORRIS, A.B., M.D.

In the autumn of 1904 a young man recently emerged from a hospital internship, and having had the temerity to send out certain medical reprints, received the following letter:

"Thanks for your papers, with which I am greatly pleased, not only for the evidence of good work they show, but for the memory of your father and grandfather. The tuberculous endocarditis paper is most interesting and will be useful, as I have just been going over all our material on the subject. Could you not come down this winter and give us a little talk at our Laennec Society? I send you a program and you will see the sort of work we are trying to do."

Needless to say the young man accepted, and thus first tasted Oslerian hospitality and fell under the spell of Oslerian influence.

The incident itself is of interest only in that it exemplifies what was happening to other young physicians in other cities. The mere fact that someone did read reprints, and especially that no less a man than Osler himself had shown a personal interest in one's efforts, was a stimulus as effective as it was widespread. Is it any wonder that Osler's death is so strongly felt as a *personal* loss by so large a part of our medical profession. And is it any wonder, on the other hand, that Osler could do and did so much during the great war in having the young Americans and Canadians who went to England assigned to duties and positions best suited to their abilities?

[1] Read March 3, 1920.

In May, 1917, when the first American Base Hospitals arrived in England, among the first to meet them and extend a welcoming hand was Sir William, who seemed to be everywhere: handshaking with everyone and inviting many to his home. During the year ending last summer alone no less than sixteen hundred guests broke

Sir William at Oxford during the War.

bread at his table. From our first entrance into the war until long thereafter a constant and steady stream of Americans flowed to Oxford. From hundreds one heard in France of their delightful welcome there.

Nor must we think that such hospitality was extended only to friends and persons of distinction. There were probably no men in

the whole American service so lonely, lost and forgotten as that lot of unattached medical officers, upward of one thousand in number, who were sent overseas in the early days, attached to British battalions, and as reward for their prompt patriotism, denied consideration as well as promotion by our War Department. Many of these men were welcomed at Oxford, although for the most part they were entire strangers to Sir William by both name and reputation.

Those who again visited Sir William after the Armistice, after the death of his son, were amazed to see with what an unconquerable spirit he met his awful loss. There was the same self-effacing kindness and sacrifice, the same hospitality and farewell dinners even for those about to return home—dinners graced by men of international repute, because Sir William was the host.

Of the hospitality meted out at 13 Norham Gardens it is difficult to speak. One did not have to be told one was welcome—one somehow felt it. It was indeed a place where, as related in the old Norse Saga of Frithiof, "Hospitality sat in gladness." She strained not, but pervaded all things. Whether one wandered in the gardens with Lady Osler, who wistfully showed one her pet flower-beds ploughed up to grow potatoes; whether one visited the military hospital or dined at old Christ Church College with Sir William; or whether of an evening one sat at ease before the open fire in the library, while being shown the treasured tomes that Osler knew and loved so well, it mattered not. The evenings passed quickly amid reminiscence, anecdote, flashes of wit and twinkles from those deep-set eyes; while questions were asked about those at home whom he had long not seen.

Advice and assistance were yours for the asking. Often indeed one heard: "You must see such and such a hospital; I will give you a letter." "Don't fail to visit ———; a splendid fellow; tell him I sent you." "If you want anything when in France drop me a line." "I was interested in your article on so and so and shall refer to it in my next edition." "You must read X., published in 1640; he was quite wonderful. But little of real importance has been added since."

Charming, always interesting and interested; always giving in

full measure of himself and of his time; always brave and smiling, and with an only son in France in the heavy artillery. A son so much beloved that it is with much hesitancy and only in profound reverence I speak of an almost sacred incident.

It was long past bedtime; we were about to "turn in" and had lit our bedroom candles, when the cheery, well-known voice from the hallway called us back. "Do you mind? I should like to show you Revere's room?"

There it was, untenanted, but just as its occupant had left it. "You must see some of his books. Are not these gems? These old editions of English classics which he has picked up. I hear from him every week."

The quiet room, in the sleepy town, the flickering candles, the musty volumes, the devoted father—it was a picture seen through an atmosphere of the teeth-gritting tenseness which pervaded the whole of England at that time; and with a background of that Hell that was being enacted across the Channel—a picture that will not be forgotten.

And it was not long afterward we learned that the dreaded blow had fallen, and that Revere, too, now slept in "Flanders Fields!"

MEMOIR OF DR. H. C. WOOD[1]

By G. E. de SCHWEINITZ, M.D.

After a prolonged, painful illness, Dr. Horatio C. Wood died in his eightieth year on January 3, 1920. To him the graduates of the School of Medicine of the University of Pennsylvania, we, the Fellows of the College of Physicians, and, in a larger sense, the medical profession of this country, are much beholden. It is altogether fitting and proper that this Collegiate Body, of which from 1902 to 1904 he was President, and for the transference of whose treasures from unsuitable and cramped quarters to the present location he was an early, earnest advocate, should devote an evening in commemoration of his notable service in the cause of science, of scientific medicine and the elevation of the standards of medical education.

Dr. Wood was born January 13, 1841, in Philadelphia, and was of the ninth generation of English Quakers who came over with William Penn. His grandfather, John Bacon, was a prominent man in this city, and was for thirteen years its Treasurer.

His father, coming from a country store to Philadelphia, grew to be a man of importance in its business circles, and was remarkable for his judgment of men. Although really not unkind, he sprang from stern old Puritan stock, and gave rigid adherence to vigorous discipline. "Growing in his garden," writes his son, "for sinister purposes was a plant whose twigs were extremely tough and from which I frequently suffered."

In those days children began, if one may use the old-fashioned words, "their schooling young," and at three years of age Dr. Wood began his, and when only four years old was sent to the

[1] Read March 19, 1920, at a Memorial Meeting to Dr. Wood, held at the College of Physicians of Philadelphia.

Westtown Boarding School, where he was next to the smallest boy among two hundred pupils, and where, as he himself has recorded, he received valuable lessons in physical tenacity and endurance of punishment without flinching, qualities which in manhood and when tempered by age and judgment, were important assets in his life's work.

For his higher mental training he was sent to the Friends' Select School of Philadelphia, saved by his father's sectarian principles, as he quaintly remarks, "from the herd-teaching of a university education."

At this early period of his life Joseph Aldrich made a lasting impression, winning, as he himself has said, his "wayward heart at once." To him he owed his knowledge of Latin, a reasonable acquaintance with Greek, a thorough training in mathematics, and that which he greatly prized and which was of inestimable value to him in later life, familiarity with the construction and derivation of the English language.

Whether Joseph Aldrich inspired Dr. Wood's zest for the Natural Sciences is not of record, but be that as it may, at an early age, when he was not more than fourteen, he haunted the Academy of Natural Sciences, eagerly anxious to examine the specimens, not within their glass-covered cases, but holding them in his own hands. Such a privilege would not ordinarily have been granted, but Joseph Leidy, then President of the Academy, recognized that this desire was actuated, not by idle curiosity, but by the spirit of an investigator. He gave the necessary order, and "So," writes Dr. Wood, "I entered into the kingdom of Natural Science."

Right royally he served that kingdom. When only nineteen he published his first scientific paper, "Contributions to the Carboniferous Flora of the United States," and within the next six years produced two other important essays on this same subject, that is, in general terms, on the plants of the coal-forming period of the United States. These studies were continued until 1873, and resulted in numerous papers, especially on cell-botany, the most important of which was published in the Smithsonian Transactions in 1872, on "The Fresh Water Algæ of North America," illustrated

with nineteen colored and two uncolored plates, and three hundred and sixty original microscopic drawings.

During this period he was also a student of entomology and enriched the literature of this subject with fourteen original contributions. His Handbook on "The Myriapoda of the United States," published in 1865, attracted widespread attention among naturalists, and Agassiz, just returned from an expedition into Brazil in the interests of natural history, placed his entire collection of Myriapoda at Dr. Wood's disposal.

Dr. Wood was not only a student of specimens pertaining to natural history as they had been gathered in various collections, but was himself a collector for the Smithsonian Institute, and made two notable expeditions, the first in the Bahamas, and the second along the valley of the Tornellias River, across the American desert to the Chisos Mountains, and down the Rio Grande into the Mexican desert. From these adventurous journeys he returned laden with specimens for the Institute he had gone forth to serve.

In 1866 he was called to the Chair of Botany in the Auxiliary Faculty of Medicine in the University, which had been endowed by his uncle, Dr. George B. Wood, and he occupied this position for ten years.

Dr. Wood's great work as physiologist, therapeutist, medical jurisprudent and neurologist is so conspicuously evident that we are apt to overlook his studies, his very important studies, in natural history. Curiously enough, Dr. George B. Wood deprecated the time he spent on them, but it was not time wasted. Independently of his additions to the sum of human knowledge in these regards, his investigations quickened his naturally excellent powers of observation, improved his judgment in relative values, increased his skill in using instruments of precision, and constituted an educational work which greatly augmented his powers with respect to matters to which he was to devote his life.

Dr. Wood was graduated from the School of Medicine of the University of Pennsylvania in 1862, and after a period of time spent as interne in the Pennsylvania and Philadelphia General Hospitals (Blockley), entered the medical service of the Army in the midst of

the trying days of the Civil War. His eagerness to be up and doing in advanced activities met, on at least one occasion, with the sharp disapproval of the commanding officer, and he was relegated to the comparatively commonplace work of a convalescent ward. Rescued from this position, which irked the very soul of him, by his life-long friend, Dr. Harrison Allen, he was transferred to a front-line hospital in Virginia, and had ample opportunities, being practically second in command, of estimating the cost of a great war in human suffering and in human life. He was in Richmond on the night of Lincoln's assassination, and witnessed the stirring scenes of that period.

After Dr. Wood's return from Service in the Army, he settled in Philadelphia, where for well-nigh half a century he labored in such wise as teacher of medicine, as therapeutist, experimental pharmacologist, neurologist, medical jurisprudent and as medical educator, striving for the advancement of the profession he adorned, that his reputation spread to all lands where the workers in science are known and honored.

He began this period of his life's work as a Quizmaster in the Practice of Medicine, Therapeutics and Chemistry, and his experiences in this field of activity gave him a skill which he possessed in unusual degree in the management of medical classes and in impressing the lessons he was called upon to expound. His devotion to the nervous system and its diseases, and his studies in this branch of medical science gained for him in 1873 the Lectureship in Nervous Diseases, and two years later he was advanced to the position of Clinical Professor of Nervous Diseases in the University, which position he held from 1875 to 1902. During this period he published something over sixty papers on Neurology, and two books, "Nervous Diseases and Their Diagnosis," 1887, and "Syphilis of the Nervous System," 1889, and made twelve contributions to Medical Jurisprudence and Toxicology.

In his vigorous days Dr. Wood was a first-class medical expert witness, defined by himself as one who has an expressionless face, a cool bearing, a complete knowledge of the subject and the power

of quick thinking and ready utterance. Sometimes bitter wit is an asset, as one attorney who was examining Dr. Wood during the course of a famous trial found out to his undoing. A great lawyer, who in his day was noted for his skill in cross-examinations, once told me that he considered Dr. Wood to be the clearest, coolest-headed medical witness he had ever examined.

Of Dr. Wood's position in the field of Neurology I shall not speak; of this we shall hear from others far more competent than I am to define it.

Dr. Wood's insistent, one might almost say restless, but always purposeful activities as a researcher are matters of common scientific knowledge. Even as an interne in the Pennsylvania Hospital, where happily for science he served for a period of time in the "sunstroke ward," as it was called, he was struck by the imperfect knowledge which surrounded the cases he was called upon to treat. On his return from army life, he attempted a research on sunstroke, which he proceeded to carry out in a laboratory he built in the yard and greenhouses of his uncle, Dr. George B. Wood, and actually designed the required apparatus which was constructed for him by a mechanic hired for the purpose. To use his own words, "he cleared up the natural history of sunstroke and the rationality of its proper treatment." The results of his investigations were embodied in a brochure, "Thermic Fever or Sunstroke," which gained for him the Boylston Prize of 1872. His suggestion that the term "Thermic Fever" should supplant "sunstroke," was instantly adopted, even in the British Military Index of Diseases.

Naturally, these researches directed his attention to the nature and causes of fever, and with the aid of a grant of $1000 from the Smithsonian Institution and additional money of his own, the spare time of the next eight years of his life was devoted to the elucidation of the problems involved. The first report of this work was published by the Smithsonian Institution in 1878, and was succeeded by other papers on the same general subject. Of these researches, which Dr. Wood himself considered the most important ones of his life, he says: "They did not originate the use of the cold bath

in fever, but they put it upon the final scientific basis, and made the treatment universal." Certainly they and his work on Thermic Fever revolutionized the then accepted theories of the treatment of fever to the well-being of those who became its subjects.

On his famous address on the "Accidents of Anesthesia" delivered before the XII International Congress of Medicine in Berlin in 1890, a well-nigh equally favorable mark may be placed. Although in a sense the proceedings of that Congress were centered on the startling announcement of Koch of his discovery of the tubercle bacillus, the essay of Dr. Wood made a great impression, the lasting effect of which was world-wide.

Dr. Wood's original work in the laboratories of physiology and pharmacology achieved results which, added to a careful and judicious analysis of conflicting literature, culminated in 1874 in the publication of his famous book "A Treatise on Therapeutics, Comprising Materia Medica and Toxicology, With Especial Reference to the Application of the Physiological Action of Drugs to Clinical Medicine." This book has passed through thirteen editions, the later ones in collaboration with his son, Dr. Horatio C. Wood, Jr. More than any single volume, it helped to lay the foundation of our present system of Therapeutics, which before the arrival of this book was based practically entirely on empiricism or clinical experience. It created a real awakening and an advance the value of which is not easily estimated. More of this pioneer work I shall not describe, nor shall I attempt to refer, except in mention, to such important researches as those which were concerned with the use of veratrum viride, the practical discovery of hyoscine, the determination of strychnia as a respiratory and circulatory stimulant, and the administration of nitrite of amyl in convulsive disorders. Concerning this phase of Dr. Wood's career we shall hear from one who ranks high, ranks first, I fondly believe, among those who "carried on" in the great work of the master therapeutist of his day.

Not the least among Dr. Wood's accomplishments were those of editor of New Remedies from 1870 to 1873; of the Philadelphia Medical Times from 1873 to 1880; of the Therapeutic Gazette

from 1884 to 1890; and most of all, of the Dispensatory of the United States of America, which continues to hold its important place in the list of the great books of the world.

In spite of his devotion to scientific research, or, more accurately, because of it, he naturally was among the first to put the vigor of his personality and the skill of his trenchant pen into the movement which he and his associates started in the early "seventies" for the elevation of medical requirements and the uplifting and improvement of medical instruction. Theirs was a great work nobly planned and accomplished in the face of unjust criticism, personal discomfort, and the risk, in a certain sense, of professional obliteration. Progress was slow, but effort was unceasing, and among the early successes was the adoption by the University of a three years' course in medicine, among the first, if not the first, School of Medicine in this country to make this advance. Dr. Wood did not slacken in his endeavors in this regard, and in 1889 the subject of his lecture at Yale College at the time he received his LL.D. from that institution was in largest measure a plea for suitable legislation pertaining to the profession of medicine. No honor is too great for these men, among whom Dr. Wood shines forth conspicuously.

When in 1874 the University of Pennsylvania was moved from Ninth and Chestnut Streets to West Philadelphia, Dr. Wood was the first to recognize the crying need of a hospital in organic connection with the School of Medicine. He, Dr. Pepper, Dr. Norris, and others of the brilliant younger set of that day worked unceasingly on this project. Ultimately, and greatly aided by the generous donation of George B. Wood, the necessary money was raised, and in 1874 the University Hospital was erected, a notable event in the medical history of this country, when for the first time a medical school could point to its own general hospital, ready for the practical instruction of its own students.

In December of his fifty-ninth year, Dr. Wood received the first warnings that the vigor of his work was telling on his strong constitution, but either he would not, or did not, heed that warning, indeed, in a sense he scorned it. But the need for rest became

insistent, and was finally accepted, although it was not until 1906 that he finally resigned his Professorship. Then followed long, bitter years of suffering before the release for which he longed finally came.

Sometimes his faith in a power higher than this earth wavered, and almost he lost the road, but only in the dark and doubting periods of intense mental and physical suffering. It is right that you should know, quoting his own words, that although he prayed for speedy death, he did so "in the hope and faith that the sacrifice of Christ and the mercy of the Lord would bring me to Beatitude."

The fruitfulness of Dr. Wood's work is attested by an examination of his Biographical Record, from 1860 to 1911, during which period he published seven books, namely:

"Thermic Fever, or Sunstroke," Boylston prize essay. Philadelphia: J. B. Lippincott Co., 1872.

"A Treatise on Therapeutics, Comprising Materia Medica and Toxicology, with Especial Reference to the Application of the Physiological Action of Drugs to Clinical Medicine." Philadelphia: J. B. Lippincott Co. First edition, 1874; twelfth edition, 1905.

"Brainwork and Overwork." Philadelphia: P. Blakiston, 1880.

"The Dispensatory of the United States of America, thoroughly revised, and largely rewritten. By H. C. Wood, Joseph P. Remington, and Samuel P. Sadtler. Philadelphia: J. B. Lippincott Co. Fifteenth edition, 1883; eighteenth edition, 1899.

"Nervous Diseases and Their Diagnosis." Philadelphia: J. B. Lippincott Co., 1887.

"Syphilis of the Nervous System" (Physicians' Leisure Library, Ser. IV). Detroit: G. S. Davis, 1889.

"The Practice of Medicine." By H. C. Wood and Reginald F. Fitz. Philadelphia: J. B. Lippincott Co., 1896.

In this bibliography are further recorded 15 papers on botany; 14 articles on entomology; 54 researches on experimental pharmacology, physiology and pathology; 13 articles on medical jurisprudence and toxicology; 142 contributions to clinical pathology, neurology, medicine and therapeutics, and 48 lectures and addresses relating to medicine and medical instruction.

On May 10, 1866, Dr. Wood married Elizabeth Longacre, daughter of James Longacre, famous in the annals and work of the Philadelphia Mint, of which he was Chief Coiner. Of Mrs. Wood's quiet charm, grace and utter devotion to her husband and their children it is not my province to speak. Of the four surviving children, three sons and one daughter, two of the sons entered the profession of medicine and have achieved success; it could not well have been otherwise with the sons of Dr. Wood. The oldest son for a time devoted himself to art, a profession which in recent years he has abandoned for the duties of farming, on the one hand, and on the other for those which pertain to a local preacher of the Methodist Church, the denomination to which his mother belonged. To the daughter, especially after her mother's death, the care of her father, the kind of care which only a woman can give, became a loving duty, performed with fine fidelity.

As a teacher, Dr. Wood was noted for a clear, captivating and convincing presentation of the subject-matter; as a lecturer he was distinguished for his forceful and fluent language, which arrested the attention of his hearers, and which was often punctuated with eloquent periods and with striking, indeed, at times, with startling, metaphors. It is not hard to visualize this vigorous man pacing from one end to the other of the long table which fronted the benches in the lecture room, literally flinging his sentences into the faces of the students, his interesting thoughts often presented happily and strikingly in a few words. These epigrams have been treasured in the memories of those whom he taught, and have remained guideposts in their future careers in the art of healing the sick. Who that had ever heard it could forget his brilliant lecture on general anesthesia wherein he contrasted the physiologic action and lethal effects of ether and chloroform, emphasizing the danger of the latter agent and the comparative safety of the former. Thus he closed: "Which shall it be, ether or chloroform? Remember you can make artificial respiration, but you can't make artificial circulation." I suspect, and not without reason, that that sentence has saved many a life. Who fails to remember his denunciation of meddlesome therapeutics, and in particular the reckless use of antipyretic drugs

in the treatment of typhoid fever. "Rather than that," he thundered, "trust to rest, quiet and diet, and send the doctor to the North Pole."

As a writer he was happy in the choice of the words with which he expressed his ideas, and which frequently reached the higher or artistic qualities of composition; as an investigator he was original in conceptions and ingenious in technic; as a diagnostician he was quick in perception, swift in analysis and prompt in conclusions. Although of a distinctively scientific bent of mind, he believed thoroughly in training the powers of observation in the sick room, and was a careful student of the facial expression of disease. Indeed, he deprecated the failure of medical men to impress upon their pupils the need of acquiring skill in this regard, not to the exclusion of the use of instruments of precision, but as an adjunct to them. He was more than willing to satisfy the exacting conscience of the Clinical Laboratory, but was equally unwilling to banish the information which trained observation of the surface play of disease could elicit. As a therapeutist he possessed, in full degree, the courage of his convictions, and was ever resourceful in the application of remedial measures. As a man and physician, he inspired respect, confidence and enthusiasm.

Sometimes he was hasty in his judgment of the actions of his fellow-man, but shown his error, he was prompt in honorable retraction, sealing it with the offer of the renewal of his sterling friendship. He battled for the right, as it was given him to see the right, and "he never flinched nor fouled; he struck the line hard."

Shortly after Dr. Wood's resignation of the Chair of Therapeutics in the University, an appreciation of him and his work was published in the *Alumni Register*, and this has quite recently been reproduced. I permit myself to quote from it, because it describes Dr. Wood's last public appearance:

"In June of 1904, on the occasion of the opening exercises of the New Laboratories of Physiology, Pharmacology and Pathology, there gathered a notable throng of the loyal sons of Pennsylvania. Yale, Harvard and the University of Michigan, each by its own

delegate, had spoken in graceful words of congratulation. The time had come to hear from the University, and as her representative, called by Dean Frazier in a few fitting sentences, stepped forward, the applause rang out clear and sharp, the cheers full-throated, rising higher and higher until they swelled into the mighty tribute of a grateful alumni. Rarely has there been finer recognition of a life's work; never one more deserved. It was a rich moment; no man in that great audience can ever forget it. Tears stood in the eyes of the speaker; his opening sentences, thick with emotion, quickly gave place to phrases framed in their accustomed vigor, holding to the very end the eager listeners in delighted attention."

Fellows of the College, and you, fellow alumni of the School of Medicine of the University, there I leave him in the halls from which the spirit and influence of his career can never depart, surrounded by an affection and respect which can never fade, secure in a reputation which has never been tarnished.

MEMOIR OF DR. H. C. WOOD[1]

By F. X. DERCUM, M.D.

It is with reverential hands that I draw aside the curtain of the past. A period is disclosed that has to do with the very beginning of medicine for me, and with a personality which impressed itself upon me during the formative period of my career more than any other with which I came into contact. For me, to this day, my teachers at the University remain as the giants of other days. Great heroic figures they were to me then and great heroic figures they have remained. It has seemed to me that I was singularly fortunate to have studied medicine at the time when Leidy and Agnew and Stille were in their prime and to have been the private student of Henry C. Chapman, the prosector of Leidy and whose colleague I was destined to become at some future time at the Jefferson; but there was another figure at the University that possessed for me an attraction that was altogether peculiar, though he was not yet a member of the major faculty, and that was Dr. Horatio C. Wood. Dr. Wood was at that time merely a clinical professor, and yet the brilliancy of his teaching and the aggressive role that he played together with William Pepper and James Tyson in advocating and in bringing about great and fundamental advances in the medical curriculum, easily constituted him the most striking figure of the group of the younger men to which he belonged.

To me was granted the great privilege of being chief of clinic to Dr. Wood for a period of nine years. In this important position I succeeded Dr. Mills, who became professor of neurology

[1] Read March 19, 1920, at a Memorial Meeting to Dr. Wood held at the College of Physicians of Philadelphia.

in the Philadelphia Polyclinic. While I had not previously been associated in clinical work with Dr. Wood, I had known him as the professor of botany in the Auxiliary Medical Department of the University and upon more than one occasion had accompanied him, together with other members of the class, in botanical excursions in the field. Here his remarkable personality made a vivid impression upon my youthful mind, and when in 1883 he selected me as his chief of clinic, I felt as though a new era had opened for me, as indeed it had. I had previously followed his lectures on therapeutics, had acted as quizmaster on therapeutics in the Philadelphia Medical Institute, and was thoroughly familiar with his didactic lectures and with his impressive and forceful delivery. I had also at times assisted him in various manometric studies and in other physiological experiments. It now became my pleasure to renew my acquaintance with his clinical lectures, which I had not followed since my student days and to derive a new and a special inspiration from them. Many of the Fellows of the College will no doubt be able to vividly recall them. They were not easily forgotten. Dr. Wood had the happy faculty of quickly seizing the important features of a case and of vividly portraying them. His expositions were clear, his speech eloquent and his delivery forceful and dramatic. The student learned; he could not help but learn, and upon me Dr. Wood's clinical lectures made an indelible impression. He rarely spent time in reading the ofttimes tiresome details of a case history, or in reading the details of the various clinical examinations that had been made, but he at once proceeded to a consideration of the salient and essential features, and, then, the diagnosis having been established, he took up the matter of therapeutics, a field which he had made peculiarly his own.

While chief of clinic, it was my great privilege to be associated with him as part author of several scientific papers and to learn something of his marvelous and prolific industry. The number of his papers and the variety of the subjects with which he dealt were very large. We commonly think of him as a neurologist and as a great teacher of therapeutics and yet his activity in other fields, *e. g.*, in botany and entomology was such as to award him

a high rank in each of these departments of learning. His papers on botany fill two volumes and this is equally true of his papers on entomology. These papers were written during his earlier years when he was especially active as a member of the Academy of Natural Sciences. His researches in experimental pharmacology, physiology and pathology fill four volumes, those on medical jurisprudence and toxicology one volume, those on clinical pathology, medicine and therapeutics six volumes. The latter include also his papers on neurology and psychiatry. Another volume is filled with published lectures and addresses, one volume with magazine articles. When we take into consideration that in addition he published a treatise on therapeutics which passed through twelve editions, that he revised and rewrote, together with Joseph P. Remington and Samuel P. Sadtler, the United States Dispensatory, a truly colossal work, that he wrote a text-book on nervous diseases, one on syphilis of the nervous system, a book on sunstroke, one on brain-work and overwork, a work on the practice of medicine, together with Dr. Fitz, of Boston, and, in addition, edited a monthly medical journal, words fail us to adequately express our amazement. Then, too, all of his scientific work—in fact everything he said or did—was featured by a marked originality. This indeed was the distinguishing character of all of his activities.

I cannot speak of Dr. Wood without a personal note. He attended me in the one serious illness through which it has been my lot to pass. He was unsparing in his time, his kindness and his attention. I recall also that when after many complications I finally recovered, my illness and the treatment he had adopted gave occasion to a rather amusing interchange of letters between himself and Dr. Osler on the value in typhoid fever of turpentine emulsion, of which I had swallowed many bottles.

I was warmly attached to Dr. Wood, and when it became my fortune to leave the University and to assume the duties of a teacher at Jefferson, I felt the separation keenly. He had been the focus of my admiration and my affection. We had been associated not only as professor and chief of clinic, but we had been together in many medicolegal cases, and he had been my favorite consult-

ant. I had been abroad with him and had assisted him at the time he delivered his great address on "Strychnin as a Respiratory Stimulant" in Berlin in 1890. Years afterward; during his own illness, our relations again became very close. For many months I saw him daily, sometimes twice daily. Dr. Musser saw him frequently and Dr. Hare also joined us. Dr. Osler too came up from Baltimore, and I well remember the happy and invigorating influence of the presence of the latter. Between Dr. Osler and Dr. Wood a special friendship existed. Dr. Wood always claimed to be the original Osler discoverer.

Dr. Wood possessed a unique and striking personality. He made his presence instantly felt. His face was strong and handsome, his voice full and round, his thoughts original. What he said was always unexpected. His language was vigorous and expressive, and whether he was in the lecture hall, at a medical meeting or in the courts of justice, he commanded instant respect and attention. His personality, also, was one to inspire regard and affection. He had a group of devoted followers who from youth to maturity never faltered in their loyalty. It is given to but few men to win such spontaneous response. Among the students his popularity was unbounded; not even Dr. Osler during his five years' stay at the University nor Dr. White subsequently was able to wrest it from him. Dr. Osler was around and about the University and the Philadelphia Hospital a great deal. He came into contact with the students and with the younger teachers most intimately. He ran the out-patient medical department himself, frequently visited the neighboring clinics, frequently the neurological clinic, which was directly opposite his own. He was universally beloved and there was only one other to whom was granted a greater tribute and that was Dr. Wood, a tribute in which he, Dr. Osler, spontaneously and generously joined.

Mr. President and Fellows a great figure has passed away; one that will be long cherished in our memories, and when we think of him, it will not only be of his scientific achievements, of his books and writings, but of his warm, his living, his inspiring personality.

HORATIO C. WOOD, THE PIONEER IN AMERICAN PHARMACOLOGY[1]

By HOBART AMORY HARE, M.D.

My friend of many years, Dr. de Schweinitz, has spoken so well in every sense of that word of my old master, Dr. Wood, that there is little left for me to say that would give to the younger Fellows information concerning him or which can serve to recall to the older Fellows the characteristics of a very remarkable man. Possibly the best descriptive word for him is to say that he was a genius, because this term embodies brilliancy of intellect with qualities which are aberrant. There were occasions by no means infrequent when Dr. Wood would grasp the chief points of a subject or research with a quickness and accuracy almost uncanny and there were other times when, because his mental activities were engaged elsewhere, or dulled for the moment, when facts, seemingly quite obvious, would pass him by so that we would stand a little aghast at his conclusions or lack of appreciation of the opportunity. Sometimes after the glimpse at a great idea seemed to be a thing hopelessly lost, Dr. Wood would suddenly rouse himself, spring after the object which had left a trail, however faint, behind it and by no means rarely would capture it, changing the onlooker from an observer filled with disappointment into one filled with admiration. These characteristics held true not only as to things which were scientific but as to affairs of life in general, and, as he suffered with all his fellow-mortals in errors of judgment, the result was that he was at the peak or in the abyss. Those of us who knew him well and were familiar with his moods were never sure in which place he would be, although the depths were never

[1] Read March 19, 1920, at a Memorial Meeting to Dr. Wood held at the College of Physicians of Philadelphia.

really very deep; they seemed so only by contrast with the peaks which he touched. He was a man utterly without guile but of great mental and physical vigor, with a very kind heart but capable when provoked of giving a youngster a severe reproof, not by a long harangue but with a well-directed dart. At times his frankness and guilelessness were like that of a child, but if because of these qualities anyone tried to mislead him he soon found that he had met a fox.

He lacked diplomacy and perhaps for this reason one always knew where he stood on a subject if you could get him to speak, and this did not require great effort. Without physical fear, he nevertheless at times honestly belittled his own mental abilities. If the spirit moved him he could soar to heights of real eloquence and descriptive vigor. If it failed to move him he was lame and remained so unless perchance someone else said, or did, something which aroused him, when he passed on the instant from a state of inertia into a change so vigorous as to knock the pins from under the bystanders and particularly from under the one who had intentionally or unintentionally aroused the sleeping lion. So, too, when in full charge an insidious or skilful side thrust might hopelessly divert him. I well recall that at the First Congress of Physicians and Surgeons a debate on a neurological topic of some difficulty was arranged with that brilliant neurologist of New York, the younger Seguin, as referee, and Dr. Wood as co-referee. Dr. Wood fully appreciated the skill and brilliancy of his antagonist and repeatedly expressed the hope that when the hour of trial came he would be worthy of his adversary and go him one better, at the same time expressing the fear that he might go to pieces. We youngsters agreed that one of the disputants would be carried out, and while we were confident that our advocate was capable we knew that if he suffered from one of his moments of humility our cause was lost. The fatal hour arrived, Dr. Wood began a little lamely, but to use a horseman's phrase, soon got into his stride and we were merry over his career; but suddenly, while we gazed upon him, his visage became blank and his tongue still, while his eyes seemed glued to an apparition. All eyes turned in the

direction of his gaze. This apparition was the woman suffragist, Dr. Mary Walker, who was walking up an aisle leading to his very feet, clad in the trousers of a male, in a frock coat with a silk hat in her hand. Like a demon of despair she seated herself in the front row not five feet from Dr. Wood and the debate was virtually ended.

These somewhat personal recollections are perhaps justified in that they give an idea of Dr. Wood's personality, but I would be sadly lacking in my task if I did not emphasize one particular point in his career that marked him as a pioneer. Until the early seventies books which dealt with therapeutics were in reality volumes dealing with the Materia Medica or at most a collection of reports upon the use of drugs on a purely empirical basis. The most notable of these works was, and is, without doubt that monumental evidence of literary research by Alfred Stillé, "Therapeutics and Materia Medica," in two large volumes. No student of the present day can believe that his library is complete without this work, the more so as it contains a great deal of valuable information as to the toxicology of drugs. Dr. Wood recognized that there was an ever-increasing source of information as to the action of drugs in original researches carried out chiefly on the continent of Europe. He clearly appreciated that the day for the purely empirical use of drugs was on the wane and that a new era was dawning in which the use of some of them at least would be based, not only on bedside experience but upon experiments that would on the one hand explain their effects and on the other make their application more accurate. With this idea in view he compiled his well-known work on Therapeutics, which was the standard work in its many editions for several generations of students.

By its means he taught the profession that the haphazard use of drugs based on the results obtained in another patient was to be regarded with caution, and although conditions of disease in human beings always modifies the results obtained in healthy animals he nevertheless emphasized this important fact, namely, that the physician must study the physiology and pathology of his patient

and apply the known physiological action of a drug to meet the condition which needs correction. In other words, he was a pioneer in directing attention to the fact that accurate therapeutics requires a knowledge of physiology and pathology, and he demanded a process of ratiocination on the part of the physician who had been in the habit of prescribing by rule of thumb because someone else had done the same thing. His conception of the action of digitalis while not entirely in accord with our present views of the effects of this drug nevertheless was remarkably in advance of his time in its accuracy, and it is interesting to note that the very prevalent use of atropin at the present time to prevent collapse or combat shock had its birth in his teaching, although few persons seem to know this. Dr. Wood for some unexplained reason had, or pretended to have, little respect for surgeons as a class, although for individual surgeons like Agnew he had the greatest respect. He had a favorite saying that the difference between a physician and a surgeon was that the former worked with his brains and the latter with his hands, and he also held that as a class they were difficult to teach as to the use of remedies, a theory which perhaps holds true today. As an interesting illustration of this we find that he taught that shock was characterized by a great fall of blood-pressure and that atropin should be used to combat it, along with the use of heat properly applied; yet after he had taught this for years, Crile, as a surgeon, republished these facts, which were at once swallowed, hook, bait and line, by the surgical profession, who believed and seem to still believe that Crile was the originator of this doctrine. I do not mean to intimate that Crile's studies were not original or not valuable, but some of the facts he presented to surgeons Wood had taught for decades without attracting the attention the subject deserved.

In the early part of this memorial address I said that Wood was a genius with all the brilliancy and all the aberrance that that term implies. He made his mark in medicine because he had visions of a coming dawn in medicine as a science, because he had force and vigor, because he fought hard for the right whenever the opportunity arose. He was beloved by his students in the days of

his strength because they were attracted by the vigor of this thought, by his eloquence and by his realness. He could no more play double than can an innocent child, but he could fight for the right like a lion. Last of all he did something that it is given to few of us to do. He filled young men with enthusiasm for therapeutics as an art and as a science and he taught them to think and by thinking to arrive at accurate deductions.

Finally, it may not be out of place for me, as one of his many pupils, to say that my master in therapeutics left with me cherished memories nebulous in the sense that they are not describable but nevertheless real. His kindly eye and his gentle smile balanced by vim and vigor have left us, but the memory of one who was a great teacher, an original investigator and pioneer in his chosen field, will linger long in the hearts of those who gained by his kindly ways, and who, if they are his true disciples, will always help younger men and endeavor to leave the world better than they found it.

REMINISCENCES OF DR. HORATIO C. WOOD[1]

By CHARLES K. MILLS, M.D., LL.D.

I leave to my colleagues, Drs. de Schweinitz, Hare and Dercum, the more formal and elaborate presentation of the work of Dr. Wood. My remarks will be brief and will be largely restricted to neurological and medicolegal reminiscences. When one attempts to recall the qualities and characteristics of another he is usually affected with a sense of his inadequacy to do full justice to the subject, and this may be as true when the personal associations have been long and close as when they have been brief and less intimate. One is seldom able to plumb fully the depths of another mind, and so I may not claim to have fathomed the psychology of Dr. Wood, although I knew him well for about thirty years. Of some things, however, one might feel quite sure. Deep feeling and high thinking were attributes of him, to remember whom we are gathered here this evening. Sincere, enthusiastic, and strenuous, he was of Rooseveltian mold.

My first personal contact with Dr. Wood was when I was a student in what was then known as the Auxiliary Department of Medicine of the University of Pennsylvania. This department was established in 1866 by Dr. George B. Wood and included a faculty of five. My attendance upon the course was in 1869, '70, and '71, at which time as many as one hundred students might be present in the class. The occupants of the chairs were all men of note in their special lines. The lectures of Dr. Reese on medical jurisprudence were well written and well read. Hartshorn

[1] Read March 19, 1920, at a Memorial Meeting to Dr. Wood held at the College of Physicians of Philadelphia.

taught us old-fashioned hygiene uncontaminated by bacteria. Hayden, an explorer of the far west, was an interesting, but somewhat eccentric speaker. The two most notable men of the faculty were Dr. Harrison Allen, comparative anatomist and zoölogist, and Dr. Wood, who held the chair of botany.

It may be truly said of Dr. Wood that he never held any position in which he did not make good, and this was as true of him at this early date as throughout his subsequent career. It was during his connection with the auxiliary faculty of medicine that he published his most important botanical researches on the algæ of North America and on a variety of other subjects.

As a lecturer on botany he had some of the qualities of a public speaker which continued with him throughout his life, although as years went on his teaching greatly improved. He was an energetic talker. Measured and sonorous, his manner sometimes gave one the impression of powerful intoning. In spite of his mannerisms he never failed to maintain the attention and interest of his auditors.

At times he took the class to various localities in the suburbs for field work in the analysis of plants. These were delightful trips in which the most charming elements of Dr. Wood's personality came to the surface.

About 1870 specialism had its real beginning in Philadelphia as in other parts of the United States. Several of those who initiated the teaching of specialties in the University of Pennsylvania had been abroad to increase their knowledge and stimulate their interest. Among those who came back from their tours among continental schools were Dr. William F. Norris, the ophthalmologist; Dr. George Strawbridge, the otologist and ophthalmologist, and Dr. Louis Duhring, the dermatologist. Dr. Wood did not study neurology abroad, but sprang into the neurological arena without much previous preparation or training. The breadth of the subject, its important relations to other branches of internal medicine, and its dramatic possibilities appealed to his imagination as no other subject could have done.

He was made lecturer on nervous diseases in 1871, while the

Medical Department of the University of Pennsylvania was still in one of the venerable buildings on the campus on Ninth Street near Chestnut.

I was one of those who actively circulated the petition to the trustees of the University, asking that Dr. Wood should be appointed to this position.

In September, 1872, the University of Pennsylvania removed to its present grounds in West Philadelphia, and in 1875 Dr. Wood's lectureship on nervous diseases was made a clinical professorship, a position which he continued to hold for twenty-eight years. Prior to the election of Dr. Wood to the chair of nervous diseases practically the only name which had any standing in neurology in Philadelphia was that of Weir Mitchell, although Meredith Clymer, Pennock, and perhaps a few others had made minor contributions to neurological literature.

After I became the chief of the nervous clinic in Dr. Wood's service in 1874, I attended almost without exception his weekly clinical lectures and had many opportunities of measuring his powers and methods.

He was quick in seizing the salient features of a case which he would analyze and describe as fully as necessary for class demonstration. He did not always accept the diagnoses which were handed him and he did not hesitate at times to tell the class that the diagnosis which I had made was incorrect. Whether his assumptions were always borne out I am not prepared to say, but in common with the class I soon learned to take these criticisms good-naturedly and in fact got a certain amount of enjoyment out of them.

I did not, like my friend Dr. Dercum, collaborate with Dr. Wood in the preparation of particular papers, experimental, clinical or pathological, but shortly after my appointment as his chief of clinic I began to report for publication occasional lectures by Dr. Wood. The reports appeared between 1875 and 1881, in the *Philadelphia Medical Times*, of which Dr. Wood was then the editor. With one exception these reported lectures are included in his bibliography, the data of the excepted report having

been used by Dr. Wood in a special paper. The reporting of these lectures which were corrected by Dr. Wood formed a distinct part of my early neurological education.

These lectures needed a little revision and polishing for publication, but contained much interesting material. I might say here that many of the neurological articles referred to in Dr. Wood's bibliography were based on cases studied in the outdoor or indoor service of the University Hospital.

Dr. Wood served on the Medical Staff of the Philadelphia General Hospital from 1870 to 1883, when he was transferred to the Neurological Staff, on which he served from 1883 to 1887, the nervous wards having been organized in 1877. In 1887 he was dropped from the staff because of some criticisms of the Board of Guardians in connection with the discussion of the causes of the great fire which occurred in February, 1885. These animadversions included a general attack on the administration of the Hospital and Almshouse. Dr. S. Weir Mitchell, Dr. Wood, and the writer some time before the fire had been appointed consulting physicians to the Insane Department. We made a report calling attention to deficiencies and suggesting improvements, among other things making a prophetic statement about one month before the fire occurred that the institution was liable to such a disaster. Meetings were held under various auspices to discuss the fire and the affairs at Blockley in general, and at one of these Dr. Wood in his usual vehement manner characterized the institution as "a whited sepulchre full of dead men's bones." Naturally such an assertion which received widespread publicity in the press was not regarded with approval by the members of the Board of Guardians and an early result was that Dr. Wood was summarily removed from his position on the staff. My recollection also is that he published in the *Medical Times* some severe editorial criticisms of the Blockley management.

Within a year, however, he was reappointed under a new administration, and he served about one year until some time in 1888, when he resigned. When Dr. Wood was dropped from the Neurological Staff of the Hospital in 1887, Dr. Roberts Bartholow,

then Professor of Therapeutics in the Jefferson Medical College, was appointed in his place, but served only a year or less until Dr. Wood was reappointed.

The neurological writings of Dr. Wood bear many evidences of his connection with the Philadelphia Hospital. Clinical cases with and without necropsies and microscopical examinations were recorded by him. He entered actively on certain phases of the work of the hospital, especially giving his attention for a time to the study of nervous syphilis, the chief outcome of this attention being his monograph on syphilis of the nervous system.

The Philadelphia Neurological Society was founded in December, 1883. Dr. S. Weir Mitchell was elected its first president in 1884, and held the position until 1890. He was then succeeded in this office by Dr. Wood, who acted as president for two years. Before, during and after his presidency, Dr. Wood at times made valuable contributions to the proceedings of the Society. Among the papers which I recall are those on chorea, which he discussed clinically, and as the result of animal experiments on nervous syphilis based largely on observations at the Philadelphia General Hospital, on Landry's paralysis, on hypnotic cures without suggestion, and his presidential address in 1891 on cardiac crises.

Dr. Wood wrote two neurological books—one entitled "Nervous Diseases and Their Diagnosis," and the other, "Syphilis of the Nervous System." Shortly after the publication of the first I read it through and used it to a considerable extent for the purpose of diagnosis in teaching and practice; in fact, I had considerable familiarity with the volume during its preparation, owing to my rather frequent contact with Dr. Wood and the great interest which we both had in the development of neurological literature. Recently, in connection with the preparation of these remarks, I have reread much of the work. Several points have impressed me now as formerly. These are, in the first place, the fluency and lucidity of his presentation which has the same quality as good narrative in a novel or romance. In the second place, it reveals the large excursions which the author took into the then comparatively recent literature of the subject in various languages, especially

the German, French, and English. Dr. Wood's book is a comprehensive and valuable monograph on diagnostic symptomatology given after a manner stamped by the individuality of the writer. If brought up to recent modern requirements, that is, through a study of neurological literature for the last thirty years, it would even today make a valuable work for students of neurology in the third year of their undergraduate course, or for postgraduates in the first weeks or months of their instruction. Of course, we have examples of other and, in some instances, more ambitious and more elaborate monographs on diagnostic symptomatology, but these are often lacking in the vitality which gave color and charm to Dr. Wood's writings and teaching.

I might cite many instances of excellent description of diagnostic semeiology in this work of Dr. Wood. A few of these are his accounts of the different types of acute paraplegia, multiple neuritis, including the recognition of motor, sensory, and mixed forms, trophic lesions, and the disorders of consciousness and memory.

In his discussion of diseases and disturbances of sensation, which he considers under the general title of sensory paralysis, Dr. Wood brings to the attention of his readers many physiological and clinical data from journalistic literature at that time seldom considered in text-books or treatises, as, for instance, the observations of Letievant, Weir Mitchell, Charcot, Burq, and many others. Great attention has been paid to the physiological, pathological, and clinical study of sensation since the publication of Dr. Wood's book, as, for example, by Head and his numerous collaborators, Trotter and Davies, Sherrington, and others, and in 1887, the date of publication of his diagnostic symptomatology, the state of our knowledge of the sensory pathway and sensory centers in cord and brain was very different from that which we now possess. Probably in the sections on sensory paralysis, therefore, more than in any other part of the work, it would be necessary to bring the facts and theories up to date; nevertheless this might be readily done.

In this book Dr. Wood shows the breadth of his experience, which he was always able to command and recount in appropriate places in his discussion of subjects whether in lectures or in writing.

He was seldom at a loss to bring forward a case which illustrated some phase of lightness or antagonism to those regarding which his exposition was concerned.

The second neurological treatise of Dr. Wood is a monograph of 135 pages on "Syphilis of the Nervous System," published in 1889. So far as the record and discussion of personal observation are concerned it is his best neurological contribution, although not as comprehensive as his work on diagnosis. As he states in his preface, the monograph is founded on the results of observation and investigation in about two thousand cases—seven hundred and fifty in the University Hospital and dispensary; about one thousand in the Philadelphia Hospital; and three hundred and fifty in other hospitals and in private practice. This book like the other volume exhibits his virility and lucidity of expression, his logical method of consideration, and his positiveness in inference.

A study of the miscellaneous bibliography of Dr. Wood reveals his large interest and labors in neurology and psychiatry. One hundred and thirty-two contributions belong in this field, these including eight medicolegal, eleven researches in pharmacology, physiology and pathology, seventy-nine clinical and clinico-pathological contributions, twenty-eight published lectures and addresses, and six magazine articles.

It is manifestly impossible in an address with necessary limitations to give much consideration to individual neurological papers of his large miscellaneous collection and I shall only make the briefest reference to two or three of those at the delivery of which I was present. These are the paper on "The Relation between Trophic Lesions and Diseases of the Nervous System," which was delivered before a joint meeting of the Association of American Physicians and the American Physiological Society held during the first meeting of the Congress of American Physicians and Surgeons in Washington in September, 1888, Dr. E. C. Seguin, of New York, having the other main paper of the occasion, that on "Cardiac Nerve Storms—Essential Tachycardia," a presidential address at the meeting of the Philadelphia Neurological Society in 1891; and a third on "Ataxic Lymphopathy and Ataxic Cardiopathy," an abstract or résumé of one of his University lectures.

Dr. Wood's admirable faculty of summary presentation drawn from the study of the literature of his subject and his personal experience is well illustrated in his paper on trophic lesions, a subject which still remains in so much obscurity that we have progressed little further than was evidenced by Dr. Wood's contribution in 1889. He strongly advanced the idea of separate trophic centers and pathways, a point of view not as generally received at that time as later and at present.

His presidential address on "Cardiac Nerve Storms," which members of the Philadelphia Neurological Society will perhaps, like myself, vividly recall, held the absorbed attention of members of the Society during its delivery. His details of the symptoms present in one of his patients, a distinguished and venerable member of the profession whom most of us knew personally, was graphic in the last degree and was itself sufficient to fix the minds of his auditors on the subject in a way which clung to their memories for many years.

The paper on "Ataxic Lymphopathy and Ataxic Cardiopathy" concentrated attention on a subject which neither before nor since has received the recognition which it deserves.

The bibliography of Dr. Wood shows that while he did not write as extensively on legal and state medicine as upon some other subjects like botany, pharmacology, and clinical medicine, his attention was at times strongly turned in the direction of medical jurisprudence. I am not concerned in these brief remarks with his papers on such subjects as medical education and its state control, or the effects of alcohol on the neuropathic constitution, but rather with the essays which record the parts played by him in important medicolegal cases concerning wills, insanity, and homicide. He figured during his active career in the courts of Philadelphia, New York, Baltimore, and other cities. Now and then I was a witness in the same case with him, sometimes testifying on the same side, sometimes opposed to him as a witness.

Dr. Wood was particularly strong in direct testimony, because of his forceful manner, his clear grasp of the questions at issue, and his method of presentation. If given free rein, which his

personality usually assured, he had the faculty of placing before jury and court a strong and logical picture of the facts. To some extent he carried into the courtroom his energetic and alluring method of classroom teaching. I have seen jury and judge, attorneys on both sides, and the courtroom audience all listening with admiring interest to his presentation.

On cross-examination he was perhaps at times too combative and too much inclined to retort, and was not always alert to foresee the net in which his cross-examiner was endeavoring to entangle him. He would, however, cut his way out of difficulties in a manner which forbade successful resistance.

When on the same side in a medicolegal case one soon found that it was best to allow him to lead the way. Always a good leader, he was not invariably a good follower. His naturally assertive and critical mind would lead him at times, in spite of himself, to give a somewhat different turn to the testimony presented by another witness whose general point of view coincided with his own. Aggressive and combative, his mind never easily acquiesced with the statements or position of another. A Quaker in origin, if he had lived in the time of the Revolution he would have been, like Hugh Wynne, a fighting Quaker.

The father of William Penn was an admiral in the British Navy, and Friends sometimes had for their not remote forebears, soldiers or sailors or fox-hunting squires, an inheritance which at times came out in their conduct in spite of the taming influence of their lately acquired creed of non-resistance.

Dr. Wood sometimes reminded me of a story which I have heard of Sir Redvers Buller and Lord Charles Beresford. These two men, distinguished in the military and naval history of the British Empire, were on a Nile steamer, Buller being in command. As they approached one of the Nile cataracts a question arose in Buller's mind as to which side, the right or the left, he should choose. Consulting Beresford, the latter at once stated his belief that it would be better to take the right, whereupon Buller promptly directed the pilot to take the left. The passage was made successfully, and Buller, turning to Beresford, said: "You

see that I was right. You were in favor of the right side and I took the left, and with what success is evident."

"Oh, no," said Lord Beresford, "I was also in favor of the left, but I knew, whatever side I advised, you would take the other."

Strong in his convictions and confident in his ability, Dr. Wood's mind without malice tended instinctively to take the other side in a controversy. While this at times may have been a source of weakness it was also a source of strength.

On the witness stand as in conversation and debate Dr. Wood's quick wit or humor sometimes came to the fore. In the Wharton trial, for instance, when the lawyer who was cross-examining threw at him the time-worn assertion that a doctor's mistakes go six feet under ground, Dr. Wood instantly retorted, "And the lawyers' up a tree." His humor tended at times to be epigrammatic and antithetic. He quickly grasped contrast in ideas or words. We doctors all know the manner in which he described the two professors of chemistry—one who taught the least chemistry with the most eloquence and the other who taught the most chemistry with the least eloquence. I might perhaps, were it appropriate, tell several stories which illustrate his quickness at retort and his play of fancy. At one time while in London attending an international congress he was walking along the street with a friend—I think it was the late Sir William Osler. Dr. Wood, always neat in his attire, at times violated some of the conventions with regard to dress. At this time he was wearing a slouched hat, a not uncommon thing with him, as some of us will recall. In this instance it was bandless and his friend remarked: "Dr. Wood you do not appreciate that you are in London where everything is more formal than in the wilds of America. Top hats, frock coats, and gloves are the regular thing and you are going around here with a hat which has not even a band on it."

"That's all right," said Dr. Wood. "Not being an ostentatious man I do not feel called upon to go around London with a band."

I trust that even on memorial occasions such memories will not be out of place. Why should we not recall the green fields and pleasant byways into which we wandered when we dwelt and thought by the side of our departed comrade?

One of the famous, or I might perhaps better say notorious, trials in which Dr. Wood appeared as a witness and in which Dr. Preston Jones and I were also witnesses for the defence, was that known in criminal annals as the Joseph Taylor case. Taylor was a man of markedly criminal type who had been convicted a number of times for crimes of violence. While in the Eastern State Penitentiary he treacherously killed one of the keepers. In the judgment of Dr. Wood and Dr. Jones, with which I coincided, he was an insane man and I have never had any reason to change this opinion. In this case, as in not a few others in which I have taken part as a witness, the judge was clearly on the side of the prosecution and did all that he could to bring about the conviction of the prisoner. The attitude of some of the judges in those days at least was so well known that the prosecuting attorney, it was said, and I believe truly, would bide his time until he could get what was known among the lawyers as a "hanging judge" before he would bring on the case. Little testimony was produced in favor of the sanity of Taylor. Some medical experts called by the prosecution having decided that he was insane, were not put on the stand for this reason.

Dr. Wood reviewed this case in a paper presented to the Medical Jurisprudence Society under the title of "The Absurdities of the Law in the Taylor Case." In this article he referred to previous experiences in homicide cases, as in the Schoeppe and Wharton cases and in the Dwight Insurance Case, in which suicide and insanity were questions at issue. In this trial, as in the paper which reviewed it, Dr. Wood came out against the absurd restrictions which were placed on his testimony and on that of other witnesses for the defence. He showed with trenchant logic the absurdities of the law in such cases—absurdities which have not ceased to exist.

At the beginning of these remarks I referred briefly to Dr. Wood's great physical and mental activity and to some of his high qualities of mind and here and there throughout them to some of his qualities, characteristics, and even peculiarities. In conclusion, I turn for a moment to another aspect of his nature which was in reality gentle and permeated with deep religious feeling. At

times brusque in manner, he was at heart considerate and thoughtful of others. He was like some fruits with bristling exterior defences, but containing a store of mellowness and sweetness within. Of this kindly disposition I saw many evidences. When in the Centennial year, shortly after I became associated with Dr. Wood, I went down, like many others at that time, with a severe and dangerous attack of typhoid fever, Dr. Wood gave unstintingly of his time and attention to assist in my recovery, and when many years later, in 1891, I was a short time in Europe he again came forward and took charge of one of my children through a serious illness. The medical student who was somewhat fearsome of him before and during examinations was often succored and encouraged by him in hours of financial distress or sickness.

It is well, indeed, Mr. President, ladies, and gentlemen, that we should gather here to pay this tribute of respect and affection to the memory of one who in his life and work illustrated the highest aims of those who have dignified the medical calling.

MEMOIR OF DR. WILLIAM HENRY BENNETT[1]

By D. J. MILTON MILLER, M.D.

William Henry Bennett was born in Philadelphia on September 17, 1843. He was the son of Edward Alexander Bennett and Judith Burton Mustin, the former of fine English, the latter of Huguenot ancestry. From the last source he may have inherited the firmness of conviction, the independence, the tenacity of purpose and other sterling qualities, which characterized him and this religious sect.

He was educated in private schools in Philadelphia and Germantown, and was a student at Brown University from 1864 to 1866. He did not graduate from Brown, but was given the honorary degree of A.M. in 1884. In 1866, he entered the Medical Department of the University of Pennsylvania, receiving the degree of Doctor of Medicine in 1869. In August, 1870, he entered the Episcopal Hospital, Philadelphia, as an interne, serving the full term of eighteen months. After the conclusion of his interneship, he was for a brief period an assistant at Dr. Parrish's Sanitarium, near Media, Pennsylvania. Four years later, in 1877, he became one of the visiting physicians to the Episcopal Hospital, resigning in 1883. It was during this incumbency, in the winter of 1879, when he was chief in the medical wards, that I first met Dr. Bennett. Then it was that I learned to respect and admire him for his kindness and courtesy to interne and patient alike, and for the thorough and conscientious manner in which he studied and treated the patients.

In 1874, he entered upon the most important work of his life, namely, his connection with the Children's Seashore House at

[1] Read April 7, 1920.

Atlantic City. A year later, in 1875, he succeeded in establishing St. Christopher's Hospital, Philadelphia; in 1877, the House for Invalid Women, Atlantic City; and in 1896, a summer camp for boys in lower Ventnor, N. J. He was, also, a consulting physician to the Widener Home for Crippled Children, Longport, N. J.; a Fellow of the College of Physicians of Philadelphia; a member of the American Medical Association and of the Philadelphia County Medical, Pediatric and Pathological Societies; of the Alpha Delta Phi Society; and, for thirty years, secretary of the Brown University Alumni Society of Philadelphia. In the winter of 1881, and again in 1895, he spent some time in Vienna perfecting himself in pediatrics.

He married Miss Ellen D. Carpenter, of Phil-Ellena, in Germantown, Philadelphia, who survives him, as well as four brothers: Edward G., Charles P., Howard H., and Dr. Francis W. Bennett, the latter a well-known practitioner of Atlantic City.

In 1908 Dr. Bennett had a cerebral hemorrhage, from which, with the exception of minor recurrences of a similar nature in 1910 and 1913, he apparently completely recovered. About six weeks before death he became incapacitated from myocarditis, which had been slowly progressing for some time, and died on May 14, 1919, in the house for children he had founded, and amidst the little ones he loved and had served so faithfully and so long.

Although Dr. Bennett practised medicine all his life, and was especially noted for, and very successful in, the treatment of infants and children, it is upon his record as a founder and organizer of institutions that his chief fame rests, and for which he will be long and gratefully remembered. His career was, indeed, remarkable in this respect. I know of none similar to it, certainly not among the medical men of Philadelphia and vicinity. During his lifetime he conceived, founded and organized no less than three large institutions and one smaller agency devoted to the care and welfare of children and women.

First among these is the Children's Seashore House. Dr. Bennett *was* the Seashore House; under his care it grew up, and

he grew with it. His connection with it extended throughout almost his entire medical life—from 1874 to 1919—a period of forty-five years! He did not actually found the Seashore House. This was the work of the late Mrs. Jas. S. Whitney and others. Dr. F. D. Castle and Dr. William F. Jenks were the first physicians, the latter's work being commemorated by the Babies' Hospital now on the grounds of the Seashore House, and dedicated to his memory. Dr. Bennett became physician-in-charge in the summer of 1874, the second year of its existence, when it was situated on Ohio Avenue, near the beach. It was at the time of its founding, and for many years after, the only charity of its kind in the country, as it still is, combining, as it does, under one roof, hospital, baby welfare and outing agencies for older children, and an outdoor camp. As its beneficent, life-saving work became known, the demand for its benefits increased, requiring successive additions to the original building, until in 1902 it moved into the present stately and imposing group of buildings at Annapolis Avenue and the beach.

When Dr. Bennett took charge the House had a capacity for about 50 patients and was open only in summer. Now it has a daily population of 105 children in winter and 450 in summer, and has since its incorporation cared for 67,000 children and 11,000 mothers. During the winter the inmates are mostly tuberculous joint and bone cases; but in the summer, children invalid from any ailment, sick babies, provided they are non-contagious, and city children simply needing an outing, comprise the bulk of the inmates. One of the invaluable and peculiar features of the institution is the Mothers' Cottage, wherein a mother can care for her ill baby as in her own home, as well as bring with her other children of the family, and thus make it possible to bring the sick baby itself. This arrangement, original with Dr. Bennett, began in 1875 with one cottage; now there are 35 of them.

Up to 1909 the House was only open in summer for four or five months; but since this date Dr. Bennett's long-desired scheme of caring for a certain class of invalid children throughout the year has been in successful operation.

As the institution grew, boys and girls over twelve years of age were given the advantage of a couple of weeks of salt air—the latter in a camp on the beach of lower Ventnor, where groups of from 30 to 50 boys, cared for by two doctors and other helpers, spend two weeks in the open air.

A second notable instance of Dr. Bennett's faculty for conceiving and executing things in his own peculiar line of work, is St. Christopher's Hospital for Children, situated in the midst of a great manufacturing district of the city of Philadelphia. Up until St. Christopher's was established, in 1875, the only hospital in the city exclusively devoted to children was the Children's Hospital at 22d and Walnut Streets. In the manufacturing district referred to, there were two large general hospitals with not over-large wards for children. It occurred to Dr. Bennett's humane and discerning mind, living as he did in this district and knowing its needs, that a hospital limited to children alone was not only urgently needed, but its establishment would enable the Seashore House in Atlantic City to retain its staff of physicians, nurses and employés during the entire year, instead of dismissing them, as had hitherto been the custom, at the end of every summer season when the Seashore House closed. The two institutions, under practically the same management, could thus mutually benefit each other. So, in 1875, St. Christopher's was opened in a small room in East Dauphin Street, with Dr. Bennett as physician-in-charge, a position which he held until 1892, when he became chairman of the executive committee, and, finally, president of the board from 1910 until his death.

Dr. Bennett's part in the founding and upbuilding of St. Christopher's has never received the recognition it deserves; it has been lost sight of in the larger work of the Seashore House. Yet he conceived the idea, collected the first funds ($500) that made the opening of the dispensary possible, drew patients thereto by his successful treatment and reputation, and by his zealous and constructive labors established the Hospital on a firm and lasting basis. It is now one of the well-known children's hospitals of the country, but is not in any way connected with the Children's Seashore House in Atlantic City.

A third noble and beneficent charity which has brought comfort and health to numberless tired, sick and invalid women is the Seaside House for Invalid Women (Mercer Memorial House), Atlantic City, founded by Dr. Bennett in 1877, and of which he was the physician-in-charge from its inception, and president since 1890. Through his personal endeavors, good judgment and foresight, it grew from a very small beginning into a strong, well-organized establishment with present accommodations for about 140 invalid women.

When one considers the thought, the labor, the attention to details and the executive ability required, as well as the difficulties to be met and solved and the disappointments to be overcome, in the upbuilding of these institutions, one cannot withhold his admiration for the man who did these things.

Throughout it all Dr. Bennett carried on for many years an extensive practice in Philadelphia and Atlantic City, relinquishing it almost entirely during the last ten years of his life to devote himself more closely to the work of the Seashore House, and for which he steadily refused and received no compensation. He had a well-deserved reputation as a children's specialist, and possessed in a high degree two qualities indispensable in the pediatric practitioner, namely, a great love for little children and a happy faculty of anticipating the individual needs of his little patients. He was especially apt and successful in infant feeding and in the dietary management of older children. Yet he encouraged breast-feeding, and welcomed the education which mothers are now receiving and which is inducing them to nurse their infants. He rejoiced on one occasion that, although he had facilities for handling 500 bottles, only 5 out of 34 mothers were giving their babies the bottle.

Dr. Bennett's love for children was fully reciprocated. It was an inspiring experience to go with him on his daily rounds through the Seashore House; as he entered each ward, or the porches whereon the children were taking their air- and sun-baths, there arose a great cheer and shout of genuine pleasure and affection.

Most of the funds for the maintenance of the Seashore House were collected by Dr. Bennett himself from those who admired him and his life-saving work, or from those who, on visiting the House, were impressed with what they saw. People from various parts of the country went over the institution and frequently gave freely to it. The money was poured into his hands without the asking. If, as sometimes happened, the funds became low as the season drew toward its close, he had but to put an appeal in the daily papers or communicate his needs to some good friends, and the necessary amount would be forthcoming. One philanthropic person, in particular, frequently gave large sums to the institution, solely because of her admiration for, and confidence in, Dr. Bennett. His interest in and love for children was exhibited in other ways than in the mere treatment of their physical ills. He was always kind and gentle with them and interested in them, his sympathetic and ingenious mind constantly devising means to counteract the effects of unfortunate and untoward antecedents and surroundings, instituting games and sports, exercise in the open, and wholesome physical and mental amusements.

Thus they were taught to sing in the wards to exercise their lungs and enliven their spirits. A school is also maintained: all the children being regularly taught, the well as well as those confined to bed. Dr. Edward B. Hodge tells me that Dr. Bennett's keenness of perception was remarkable: he says that one of the old employees of the House used to remark that what Dr. Bennett did not see he heard, and what he did not hear he smelt. He was thorough and exact in all his work, going into the smallest details with the utmost minuteness; at the same time he avoided opposition from those associated with him, by not being overcritical in matters of minor importance. Like his Huguenot ancestors, he possessed great firmness of purpose, holding tenaciously to his opinions until fully persuaded that he was in the wrong. That his was a nature not readily turned aside by obstacles and discouragements is abundantly shown by the manner in which he founded and built up the benevolent institutions with which his name will be forever associated. He

possessed rare common-sense, and thus frequently accomplished where others would have failed. His conscientiousness and devotion to the Seashore House is illustrated by the fact that during his last illness he engaged all the nurses, doctors and caretakers for the approaching summer season in the House and Boys' Camp, paid all the outstanding bills and had $2000 in hand to begin the summer work. This required much correspondence, yet he compelled himself to do it. He literally *spent himself* for the Seashore House, refusing to use the elevator and foregoing the assistance of a stenographer until a few years ago, because of the expense their employment would entail. For the same reason, when placed on a milk diet during his last illness, he insisted upon paying for the milk himself; he would not use the House telephone for his personal calls, and he never took a holiday.

Dr. Bennett was extremely modest and retiring; he would have strenuously objected to many of the statements in this sketch. He was ever courteous and polite, a true Christian gentleman, thinking no evil, having the greatest consideration for the feelings of others, always wishing to help and to save others, and not thinking of his own aggrandizement. Thus he gave up the hope of a competence from medicine to serve the Seashore House. He was most conservative in his professional opinions and practice; he abhorred medical commercialism and quackery, particularly that too frequent form of the latter which masquerades under the garb of legitimate and ethical medicine.

He was a loyal and patriotic American and an ardent Republican, never failing to cast his vote. He encouraged patriotism in the children and employees under his care; every year there was a flag-raising with appropriate ceremonies at the Seashore House, and during the great war, much work was done on his initiative in buying Liberty Bonds and War Stamps and in entertainments for the stricken children of Europe. Dr. Bennett's religious faith was that of a Baptist, although he attended the Episcopal church, of which his wife was a member.

The accuracy and business methods which Dr. Bennett exhibited in the institutions he managed, he extended to his private affairs.

Every bill was promptly paid and sent out in the next mail. He made few contributions to medical literature, but he invented a roller which made plaster-of-Paris bandages in two minutes instead of fifteen; this he dedicated and gave to the Red Cross Society. He also devised a new method for making the ring test for albumin.

But no memoir, however well written and appreciative, can record and perpetuate the achievements and character of Dr. Bennett better than the noble house he reared for the welfare of children; its beneficiaries in the future, as in the past, will arise and call him blessed. Macaulay concludes his famous essay on Samuel Johnson with the words: "He was both a great and good man." Of this type was Dr. Bennett: He was, indeed, both a great and good man and wise physician, a lover of and loved by little children. Happy and fortunate above his fellows is he of whom this can be said when the call comes to cross the Bar.

REMINISCENCES OF AN AMERICAN PIONEER IN EXPERIMENTAL MEDICINE

By HORATIO C. WOOD, M.D.

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DR. WOOD AS A MEDICAL TEACHER

By G. E. de SCHWEINITZ, M.D.

DR. WOOD'S BIBLIOGRAPHICAL RECORD

PREFACE

THESE *Reminiscences* were written by Dr. Wood toward the close of his life. He had long been ill; he suffered severe mental distress and physical pain. In his letter of instruction as to their disposition he requested that they should be published under the auspices of the College of Physicians, and that they should be incorporated in a volume of its *Transactions*. Although he did not forbid revision of the manuscript, he expressed the wish that it should be printed in the form in which it was received. This wish almost literally has been complied with, save only where, with the aid of his sons, Dr. Horatio C. Wood, Jr., and Dr. George B. Wood, a few lapses of their father's memory have been corrected. The appreciation of Dr. Wood as a medical teacher was written in fulfilment of a promise.

These *Reminiscences* will make their greatest appeal to those whom Dr. Wood taught and inspired in the days of his vigor. They will receive them with sympathetic understanding, and be glad to revive their memories of him to whom they owe so much.

G. E. DE SCHWEINITZ.

REMINISCENCES OF AN AMERICAN PIONEER IN EXPERIMENTAL MEDICINE

Educational Period

As the development of character depends almost as much upon early environments as upon the original tendencies of mental and physical powers, I venture to begin by saying that I am of the ninth generation of English Quakers who came over with William Penn. My ancestor, Richard Wood, was very intimate with Penn; but when it came to the question of founding a city, he insisted that to be a success it must have free access to the ocean. Therefore, when William Penn selected the site of Philadelphia for a new city, my ancestor built a large brick house in southern New Jersey, on the Cohansey Creek, near its confluence with Delaware Bay. The water in the creek at the point selected was of sufficient depth to accommodate the largest vessels of that day and the location afforded an excellent harbor. The discovery of coal and other circumstances, however, led to the development of Philadelphia and to the dwarfing of Greenwich.

My maternal grandfather, John Bacon, was a prominent man in Philadelphia, and was for thirteen years treasurer of the city. On his eighty-first birthday he gave a party to his accessible grandchildren and great-grandchildren, in number fifty-five.

My father came from a country store to the city, and grew to be a man of recognized importance in business circles. Strictly honest, at heart affectionate, he had a most exalted sense of duty, and most old-fashioned ideas of the value of the rod. Growing in his garden for sinister purposes was a plant whose twigs were extremely tough, and from which I frequently suffered, until at last I sent him word that if he struck me again I in turn would strike him, and never again did he strike me. His early discipline,

however, gave me a realization of the importance of subordination in the relations of men.

I do not want to give a wrong impression of my father, who really was a kind man, but of the stern old Puritanical stock. A remarkable man of business, he was also remarkable for his judgment of men and for the trust he reposed in them once that judgment had been formed. During the Mexican War he was a member of a large and very successful wholesale firm which sold to the Government cloth for uniforms. My father announced that, as a Friend, he could not aid warfare in any way, and that he would resign from the firm as it was not right for him to oppose the majority. A few days later a young man, in response to an advertisement, came into his office, introduced himself and asked that he might be his partner, saying, however, he had no capital, only a good knowledge of the business. After an hour's talk, my father told him to come back in a week, and at that time asked him what share of the profits he thought he ought to have; this being agreed upon, for many years they did a business of a million dollars a year, though not a word of writing of any kind ever passed between them. When age dissolved the partnership the "young man" became the president of the Philadelphia Trust Company.

I was sent to school at three years of age; at four years I could read children's books easily; and so progressed until I went to the Friends' boarding-school at Westtown, where I was next to the smallest boy in a school of over two hundred pupils. Strictly pacifist in its theory, this school was in fact so organized as to cause much fighting among the boys. It owned over a square mile of land, well covered with shellbark and other nut trees and various fruit trees, the product of which the pupils were allowed to have. To obtain a fair distribution the class was organized into two parties, the large and the small boys, and it was arranged among themselves that each large boy should have a small boy for a partner. At a stated time all were assembled in the main room; the name of the smallest boy was called out, whose duty was immediately to start for some tree pre-

viously selected, and the unbreakable law gave him the ownership of that tree for the day, provided he could remain under or in it. When his larger partner arrived the physical forces were equalized, but until then the small boy often received a most valuable lesson in physical tenacity and endurance of punishment without flinching; qualities which in manhood, when tempered by age and judgment, are very valuable. Of course out of these feuds grew numerous battles, and the training that I there received in the manly art stood me in good stead in later years. Later on I attended the Friends' Select School in Philadelphia, where the full Quaker garb with broad-brimmed hat was a great temptation for the public-school boys, though not often to their personal advantage, for the Westtown boys were trained veterans.

As for my higher mental training, my father's sectarian principles saved me from the herd-teaching of a university education, and I was educated in the Friends' Select School of this city. Edward D. Cope, the famous paleontologist, Thomas Scattergood and Samuel L. Allen were my classmates; the first two of these, however, were not graduated by this school. An ex-college professor, Joseph Aldrich, was the teacher who won my wayward heart at once. He carried us to a point beyond most of the colleges in Latin and to a sufficient knowledge of Greek; in mathematics through differential and integral calculus to practical astronomy; and gave special instruction in the construction and derivation of the English language, which in later years was of inestimable value to me.

My taste for natural science developed at a very early age. I must have been about thirteen or fourteen years old when I was crying over a case in the Academy of Natural Sciences because of my mad desire to have the specimens in my hands and to examine them closely. It so happened that Professor Joseph Leidy came out of his private room and said to me, "What is the matter!" I replied that I wanted really to study the specimens with the aid of the books in the Academy library. Professor Leidy said, "I will soon arrange that," and gave the order, as

president of the Academy, that I should be allowed to have access to any case I wanted. Thus I entered into the kingdom of natural science.

For a number of years I was sent in the summer to a farm, with the belief that I was working for my board, though in fact my father paid it. In this way I developed a muscular strength and endurance much beyond that of the ordinary city lad. One incident will show how this bringing-up produced quickness of perception of what to do in an emergency, determination in carrying it out, and some recklessness of possible results.

In South Jersey it was the custom at that time to turn the young cattle on the farm out on the marsh early in February, where they remained, out of sight of man, until the mosquitoes became so bad in August that it was necessary to drive them to the upland. By that time the cattle had become really wild animals. The uncle on whose farm I then was, a strict Friend and past middle age, took me with him to drive the herd from the marsh. A narrow, open, plank bridge separated the marsh from the upland, over which it was necessary to drive the cattle. One heifer was recalcitrant, and after driving her several times to the bridge and having her rush back on me, I made a leap and caught her by the tail close to the body, and we went at full gallop backward and forward through the mud and water, my uncle crying at the top of his voice: "Horatio, Horatio! Let go the tail; let go the tail; thee'll pull it out!" But Horatio did not "let go the tail," and the tail did not come out; and so we finally crossed the bridge.[1]

[1] For the following letter, which was written to Samuel L. Allen (afterward the manufacturer of the Planet Junior agricultural implements) in 1859, we are indebted to his daughter, Miss Elizabeth R. Allen:

7–3–'59.

DEAR SAM:

Thy acceptable letter was duly received, as are most committed to the care of Uncle Sam. Thee does not quite hit the nail on the head in thy suppositions concerning my unwonted silence. The truth is, I did not know where to write, thee having left me completely in the dark on that score. It was in the bargain that thee was to fire the first gun.

The configuration of this section of country is greatly modified and abominalized by the salt marshes, or "ma'shes," as they are often called. The larger creeks,

A further, later-day, very important educational force was my uncle, Dr. George B. Wood, one of the most eminent physicians of his day, who, being childless, took great interest in my medical career and I became almost as a son to him. He was essentially

as the Cohansey, are surrounded by belts of lowlands, which the high tides overflow, keeping many of them in the constant consistency of paste.

Upon these tracts grows a sort of grass or trash, much of it fit only for manure. But they turn cattle on them to pick their living; thee may judge of their value from the price of board for cattle. The charge for the season is $1.50 per head. In the distance, the beautiful green of these marshes and the band of nodding reeds which skirts their borders, give them a very fine appearance.

But it is emphatically distance that lends enchantment to the view. They breed and swarm with millions of mosquitoes, gnats, gadflies, "triangular flies," greenheads and the whole brood of pestilent insects, which hive forth to the plague of the surrounding country.

I have met with the greenheads before, but they always confined their depredation to cattle; here they attack men and beasts indiscriminately. Many an hour have I spent since coming here in the heart of the mosquito country, always above my ankles, and sometimes over my boot-tops in mud.

My last trip was the most vexatious. We went to bring four wild calves ashore. On our arrival (at the creek) we found the bridge partly carried away by the tide. So we had to bring rails from a fence to mend it with. That part of the marsh was very soft, so that each step would take us in nearly to our boot-tops, and the mud so adherent that we could hardly pull them out, and it took good management not to leave our boots behind us. Now put a couple of heavy rails across thy shoulder, in such a place, requiring both hands to sustain them, and swarms of gnats and mosquitoes settling on and probing thy face. If thee can imagine such a state, then thee'll have the faithful picture of our condition.

But that was not the worst, for we found the only way to get them ashore was to run them down. For a couple of hours we were coursing over that expanse of liquid earth, now rushing through the waist-high, wet, salt grass, now falling over an unseen ditch, till we were in a woeful plight both as regards muscle and clothes.

Once I seized one of the animals by the tail, and *mirabile visu!* what leaps I performed over that marsh, till Uncle John hallooed that I'd break his tail; if he had not spoken, I would have held as tightly as did the witch to Tam o' Shanter's mare Meg. I would have loosened the tail or subdued the beast.

Another time, I seized one emerging from Stoe creek, in which he had taken refuge from us, and I tell thee we had a roll and tussle in the ditch. But I held him! At last we finally got them all ashore, save one, which swam Stoe creek and is—? Wherever he may be, I devoutly hope the flies, etc., may leave but little of him but skin and bones.

We have about one hundred acres of upland and marsh to mow. When we get through I hope to get the job of hauling marl from a tertiary bed near here. If I do, thee may imagine it will tickle me a mickle. Do you haul the green or cretaceous marl? If so, please remember me and save the shells.

I am becoming more confirmed in my skepticism of the probability of ever being satisfied as a farmer. I do not know what I shall go at. I am, as I told thee last winter, tossed on the dark ocean of uncertainty and doubt, but I think I will come out all right by and by. The bark that weathers a storm shows her seaworthiness.

Please excuse mistakes on the plea of laziness, and it is so dark here I am scarcely able to follow the lines.

Very resp.
H. C. Wood, Jr.

an aristocrat, exceedingly orderly, punctilious and polite. One evening he had been with me in consultation, and as we walked home said he was very tired. I suggested getting into a street car, which ran directly past his door. The old man went to the top of the pavement, drew himself up to his full height and said, "Horatio, I would have thee know that I never have and never will demean myself by riding in a street car; when I ride I ride in my carriage." And so he dragged his weary feet home.

Once when I was a practising physician my father was out of health, and I said to my uncle: "Father is failing. The best thing is to send him to Europe, but he will not go; I want thee to help me." Immediately the old gentleman was in a fury, and said: "Horatio, send back the proofs thee has of the *U. S. Dispensatory*, and never again in any circumstances is thee to cross my threshold; the supervising of my general affairs and estate I will put into other hands." I replied, "Uncle, I am very sorry I have offended thee, but I do not know in what way." He said: "A whippersnapper like thee trying to use me for thy purpose! If thee had any sense, instead of saying what thee did, thee would have asked me in consultation to see thy father, and then if I thought he ought to go to Europe I would order him to go." My apology and humility brought peace again into the apartment.

Perhaps the most useful practical lesson I ever received was from an account by my uncle of a consultation with old Professor Chapman, whose active life was passed before the discovery of auscultation and percussion. Professor Chapman asked that a chair be placed about ten feet from the patient, and as much light be given as possible. After ten minutes' steady gazing at the sick man, as he left the room he said to the then young Dr. Wood: "Your patient will develop in the next twenty-four hours unmistakable evidences of pneumonia of one upper lobe," and his prediction, made from the patient's facial expression, proved to be correct. Thus I was taught the necessity of perpetually training the powers of observation in the sick-room. It came to pass that called in consultation in the case of a much-

beloved professor of the University of Pennsylvania, very ill with what was supposed to be chronic dysentery, I saw that the facial expression was not that of dysentery, and on opening his mouth found that he was in an advanced stage of scurvy, which subsequently rapidly yielded to proper treatment.

In another case, quoted for the purpose of illustration, I was called in consultation because the patient's general symptoms were very serious and quite out of proportion to the size of the small patch of pneumonia which the doctor in attendance had found in the left lung. I immediately noticed that the patient lay on the right side, whereas in serious pneumonia the patient lies on the diseased side so that the healthy lung may have full play for the increased work required of it. A few minutes' examination showed that the right lung was almost solid from top to bottom.

Mechanical apparatus has so entered into the practice of medicine that sometimes I have thought that doctors ought to be called mechanics. I believe the trained fingers of the older doctors often could read more truly the indications of the pulse than does the modern scientific physician with the aid of his instruments of precision.

War Experiences

After my services in the civil hospitals as resident physician I entered the service of the United States, then in the midst of the Civil War, and saw an abundance of its horrors. The rules of the service were that the young physician should not do a major operation without the consent of, or order from, the chief of the hospital. I reported to my chief that there was a soldier in the ward whose arm should be taken off above the elbow on account of hospital gangrene in the lower arm. Instead of coming, as was his duty, himself to see the case, he sent a surgeon in whom he had confidence, who reported to him that I was only a young fool, who knew nothing, and no operation was performed. The patient lived only for a day or so, and the commanding officer, in

order to save his face, dismissed me in disgrace to the convalescent ward, where there was nothing to do. Two days later my friend Dr. Harrison Allen, who was in charge of one of the largest of the front-line hospitals, obtained an order from the Surgeon-General that I should be transferred to the Virginia Hospital, where I became practically second in command. It was here that I saw the real horrors of war. General Grant was going through the Wilderness; we would perchance get an order on Monday to clear the hospital, and every patient, whether he lived or died, had to be sent North, whither we knew not; whilst not later than Tuesday the wards would be filled with the fresh victims of Moloch. The most pathetic scenes of my life, I think, were those with the mothers and sweethearts and close relations, when they came down to see their wounded, and we had to take them to their graves, or perhaps tell them they had been sent into the North, where, we did not know.

Once during this war experience I nearly lost my life. It was in the hottest of July weather; the train, of which I was second in command, was so overcrowded that I gave up the stateroom, to which I was entitled by my rank, to the wounded and went to sleep myself on the top of the car. When I suddenly awoke I had rolled to within four or five inches of the edge. The rest of the night I stayed awake.

I was in Richmond when Lincoln was assassinated, and such a mass of terrified people I never saw, as they all were convinced that the soldiers would murder them out of revenge. In point of fact, however, the soldiers were kept in their barracks for a day or two, and no violence occurred.

Natural History Studies

My first scientific paper was published in 1860, when I was nineteen years old, by the Philadelphia Academy of Natural Sciences, and was followed in the same year, and in 1866, by a second and third study; all of these were on the plants of the coal-forming period of the United States. In 1867 the Academy

published my first paper on the "Fresh Water Algæ;" this was followed by other papers on the "Fresh Water Algæ of North America," amounting in all to eleven articles, including a quarto of 270 pages published in the *Smithsonian Contributions* in 1872, with 19 colored and 2 uncolored plates, all reproductions of 360 microscopic drawings made by myself. In 1861 I published my first entomological papers, and by 1869 I had published fourteen papers in various scientific journals, all these papers being on *Myriapoda*[1] or on *Phalangideæ*, mostly of North American species, but sometimes inhabitant of other continents.

Dr. George B. Wood was never well pleased at the amount of time which I spent on the study of natural history; but it was in fact well spent, because it taught me to see differences which would be commonly overlooked; and also to perceive the relative value of degrees of differences which make the distinction between species and genera. Also, it improved my skill in using the microscope, and thus was an educational work which greatly increased my power for the matters to which I was to devote my life.

Twice, without any thought of recompense on either side, I have collected specimens for the Smithsonian Institution:

First in the Bahamas, where I began by hiring a well-grown boy, the evident descendant of a British soldier or sailor and a colored mother. The first day we walked about twenty miles, most of it through white sand in which we sank to our ankles. The next day

[1] In 1865 Louis Agassiz headed a large expedition to Brazil. Shortly after his return he wrote the following letter (the original of which is in the College of Physicians) to Dr. Wood, whose monograph on the *Myriapoda* of North America had been published the year before:

CAMBRIDGE, October 21, 1866.

DEAR SIR:

While in Brazil I have collected a good many myriapods, in every part of the empire I have visited, and I will gladly put the whole at your service, as soon as the specimens can be picked out; but I cannot say how soon this will be possible, as I cannot make a beginning with the arrangement of my collections before I can secure the means of buying about 5000 gallons of alcohol to carry the work through.

Very truly yours,

AGASSIZ.

Dr. H. C. WOOD.

the boy said to me, "Massa, I looked at you and I did not tink you was much, but I find out you am a trabler." The staple animal food of the natives is fish, which can be sold in the markets only when alive. The variety of fish on sale was very great. So, with buying in the markets and hunting on the land, I was able to secure a large number of specimens. When I landed in New York, the customs officer, seeing the amount of my baggage (casks and boxes), thought he had a prize and swooped down on me; but when I convinced him they were the property of the Smithsonian Institution, he simply said, "Well, you have got a h——l of a lot of specimens!" I had also a half-tamed live lizard (*iguana*), five feet long, which, with a collar and chain, walked behind me like a dog; but I had not gotten a square away before I was forced to call a carriage to escape the crowd.

The next time I represented the Smithsonian Institution. I went in company with a U. S. Army exploring expedition into the unknown regions on the Mexican border of Texas. The expedition, made up of army officers, scouts, etc., numbered nearly three hundred men. We went along the valley of the dried-up Tornellias creek, then across the Texan desert to the Chisos Mountains and down to the Rio Grande and into the Mexican desert. Twice we came near dying of thirst. The last time we were in the Chisos Mountains. We knew that the Rio Grande was not more than twelve miles away, but wherever we went we came to impassable precipices. With the expedition there was a scout, a Seminole, by the name of July Jesus. Although he was largely of negro blood, yet he retained the instincts of the Indian. At last, knowing the commander very well, I insisted that he put the column under the temporary guidance of July Jesus. The river was south of us, but after carefully overlooking the surrounding mountains he led us at first due north and then circling to the south came to the Rio Grande. We were, I believe, the first white men on record to see the Great Canyon of the Rio Grande. I may say that the West Point engineer who was our commander was successful in taking home the data for a general map of the country.

I knew that July Jesus had never been in the country before, and asked him how he knew which way to take. He said, "Lor, Massa, I had no wahter, so I had to go to de ribber." Evidently his subconscious brain was much more developed than his conscious brain, for what we call instinct is really the workings of a subconscious brain, which is very highly developed in many animals and also in the low types of men, whilst the conscious brain is developed scarcely at all. In the higher types of men the conscious brain is developed at the expense of the inferior organ. I once said to a friend in passing, "How do you do?" No reply. Then I spoke louder, when he said, "Excuse me, Doctor, I did not hear you the first time." I said, "If you did not hear me, how did you know I had spoken twice?" He could not answer, but I knew that his conscious brain had on the second question perceived the record made on his subconscious brain.

University of Pennsylvania Life

After the close of the Civil War, when I returned from the medical service of the United States Army, I immediately became a private teacher, or quizmaster, making a large portion of my income by instruction in three branches of medicine, namely, practice of medicine, therapeutics and chemistry.

At that time, according to the law of the Medical Department of the University, a man could graduate in two years, but in fact in about twelve months of actual study, and in many cases in even ten months. And further, there was no supervision whatever to show that the lectures during this period were really attended by the student. The private teachers, known as quizmasters, were of greater practical value than the professors, and the best of them had large classes, which paid well for services rendered.

The private teacher had, however, no official control of the students except through his own personality. For instance, I once asked a man in an upper class what the odor of conium resembled. His answer was negative, so I told him it smelled

like mice. He replied, "How the h—l do mice smell?" I answered immediately, "With their noses, of course." The class crushed him with their uproar and applause. In this school I learned much of whatever skill I had in the management of medical classes.

In 1873 I was elected Clinical Lecturer of Nervous Diseases; in 1875 I was advanced to Clinical Professor of Nervous Diseases; and in 1876 was made Professor of Materia Medica and Pharmacy, to which title was added that of General Therapeutics in 1877. At this time the Department of Medicine held its own commencement exercises at the Academy of Music. The "commencement" of the class of 1880 furnished the occasion of a noteworthy, albeit unruly, demonstration. The men of the College Department, never, at that period, friendly to the medical students and "at outs" with the Provost (for what reason I do not know), gathered in numbers, strengthening their ranks from among their acquaintances, and filled the galleries and the available space in the amphitheatre. When the clergyman (I think an Episcopal bishop) rose to open the proceedings with prayer, these students broke out into all kinds of ribald shouts, hisses and groans, and finally drove the clergyman to his seat. The Provost then rose, but in his turn was forced to sit down. By this time the whole Academy was in confusion. I was sitting with the faculty on the platform, and my old preprofessional education in practical pacifism, which I had received at the Friends' Select School at Philadelphia, suddenly shot up from the depths of my being in an overpowering impulse. Quickly throwing off my robes, jumping over the footlights into the aisle below, I said to the medical students sitting there, "Come boys, let's clean them out!" Instantly the whole body followed me. What exactly happened in that amphitheatre I cannot clearly remember, save only the tapping between the shoulders by myself of the last man, who went almost headlong to the bottom of the stairs. The arrival of the police put an end to the riot and the proceedings continued with due propriety.

Impressed with the deficiencies of the medical education of

this period, resulting only too often, as it seemed to me, in imperfections in diagnosis and treatment which amounted to malpractice, I wrote an article, couched in vigorous language, designed to expose the whole system and point the way to radical changes. In spite of urgent objection, and because I believed the time had come when "plain speaking" was required, I published this paper. Its appearance in print subjected me to bitter and unjust criticism, even, I regret to say, on the part of a colleague in the course of his lectures, to such an extent that on one occasion the students endeavored to hiss me out of my own lecture room. In the midst of a demonstration of furious disapprobation, I stood quietly for half an hour, until the storm subsided, and I concluded, uninterrupted, my lecture.

Dr. William Pepper, afterward Provost, loyally supported me in these endeavors to rectify the faults in our system of medical education: the faculty was strengthened, the contest between the "reactionaries" and the "progressives" continued unabated, until those who strove for an elevation of standards were victorious. The primary step consisted in the adoption by the University of a three-year course in medicine, in this regard being the first, or one of the first, medical schools to make this advance. Other schools soon joined in the movement and today we reap the advantage of these early struggles.

When in 1889 I made an address at Yale University and received the honorary degree of LL.D., the subject-matter was concerned largely with the necessity of enacting legislation with reference to the profession of medicine. There was at that time, I believe, no law whatever upon the subject in the United States. The address was received with approval, especially by the President of Yale University, and I think started the movement which has gone on until, now, legislation has become, in my opinion, a burden to professional advancement.

When in 1874 the University of Pennsylvania was removed from Ninth and Chestnut Streets to West Philadelphia I recognized the necessity for the formation of a University Hospital, and after consultation with some of the younger men we formed

ourselves into a self-constituted committee, and with the approbation of the Trustees, at my suggestion, Dr. William Pepper was made Chairman. We agreed, that with the help of Dr. Norris, Professor of Diseases of the Eye, we would undertake to raise the $500,000 which would be required. I obtained a large subscription from my uncle, Dr. George B. Wood, from Mr. Henry C. Lea, from the president of the Baldwin Locomotive Works, and from my cousin, Richard Wood; and, finally, Dr. Pepper and myself agreed to divide the two sides of North Broad Street. Each day, after consulting the *City Directory*, we made the necessary calls. Sometimes we would get $10 or $15, sometimes larger sums. One butler did not like Dr. Pepper's face, but before the menial could slam the door shut, Dr. Pepper put his foot in the way, and said, "To-morrow I shall ask Mr. So-and-so if this is the treatment he teaches his butler to give to his best friends," and the butler collapsed. In this case Dr. Pepper secured $500.

Following out our plan, we finally obtained the required $500,000, and the Hospital was built. More than four-fifths of the money was secured by Dr. Pepper and myself.

I was also active in other financial enterprises for the University: When in 1906 my professorship was resigned, on account of failing health, it was found that I had collected about as much money for the University as the salary I had received during the whole period of my connection with the institution. By vote of the Board of Trustees I was made Emeritus Professor of Therapeutics and Materia Medica.

Perhaps it is not too egotistical for me to state that before a suitable vacancy occurred in the medical faculty of the University I was offered a professorship in the College of Physicians and Surgeons of New York (now Columbia), also in the Bellevue Hospital Medical College; but preferred to wait for an opening in my Alma Mater. Later in life I was offered the professorship of Therapeutics in Johns Hopkins University, with the privilege of a two years' vacation on full salary; and also that of Theory and Practice of Medicine in the Jefferson Medical College; but still remained steadfast.

The amount of my time given to experimentation and writing might lead a reader of this paper to the conclusion that I did not do private practice. The truth is, however, although I never had a large family practice, the combined receipts from consultations, reaching as far west as Minnesota, from teaching, from copyrights and from medico-legal practice gave me a professional income approaching closely in amount to that of any other doctor in Philadelphia, with perhaps two or three exceptions. I hold most sincerely that unless a professor of a practical branch of medicine does private practice he cannot understand the proper management of patients and the use of remedial measures not strictly medical, and therefore is not fit to make fully informed doctors out of students.

Researches

I entered the University Medical Department at eighteen years of age, but under the rules could not graduate until I was twenty-one. My twenty-second year was spent as resident physician in Blockley, where there were only four of us to do the work of the medical wards, instead of twelve. The next year I spent as resident in the Pennsylvania Hospital, and fortunately was put in charge of the sunstroke ward, which was large and very crowded. The first thing I noticed was that no two of the superior staff agreed in their form of treatment of such cases; hence I concluded it was all worthless. I found that the autopsies, whose published results were most varying and baffling, were made about twenty-four hours after death, and hence suspected that the results found were due to putrefactive changes. Therefore, I made autopsies twenty to thirty minutes after death, and obtained satisfactory results.

After my return from the war I decided to attempt a research upon the subject of sunstroke, but had the greatest difficulty in finding any place where I could work. There was not then, to my knowledge, a single physiological laboratory in Philadelphia, and in the University of Pennsylvania not even a room which was not occupied. Finally I decided that my work must be

done, if at all, in the stables, greenhouses and yard belonging to the house of my uncle, Dr. G. B. Wood, where there was abundant room, and without trouble obtained his consent to use these places. I was obliged to design the necessary apparatus and have it made by a carpenter or mechanic. It also chanced that the giving way of a portion of the surface of the yard revealed an exceedingly deep well, probably originally of Colonial work, and later covered with dirt sufficiently deep for the grass to grow over it. This well afforded a receptacle for the bodies of animals. When all was ready I began to investigate the cause of the extraordinary quickness with which postmortem rigor develops in sunstroke. I found, as is well known, that postmortem rigidity is due to the coagulation of myosine in the muscles; but I found that myosine which had been produced in overworked muscles coagulated much more quickly than normal myosine and at a lower temperature.

The next query that came to my mind was: Why there were certain cases of sunstroke, almost if not invariably occurring in men who were doing heavy work, especially among marching troops in India, which were swiftly fatal? It was easy to prove experimentally that such overwork as heavy marching threw excessive work on the heart, and that these cases of "cardiac sunstroke" were due to sudden coagulation of the myosine of the heart. Next came to me the thought: Is all this really due simply to heat? I soon proved by local heating of the brain that it was possible to produce all the cerebral symptoms of sunstroke with no other manifestations; also that a rapidly produced general sunstroke in a rabbit was so immediately relieved by immersion in cold water that fifteen minutes later the rabbit was quietly nibbling at the grass.

Thus I had cleared up the natural history of sunstroke and determined its proper treatment, namely, to cool the sufferer by ice-cold baths as soon as possible. In my essay I suggested the name of thermic fever instead of sunstroke, and almost at once this name was adopted in the *British Military Index of Diseases.*

These researches naturally interested me in the nature and causes of fever, and aided by a grant of $1000 from the Smithsonian Institution, and the expenditure of about the same amount of money of my own, I demonstrated that division of the medulla where it joins the pons does, as had been previously asserted, produce at once enormous rise of the bodily temperature. Further, that this rise of temperature, as well as that produced by the injection of semiputrid material into the blood, is caused by excessive heat production, but also to some extent by heat retention in the body. For this research I had to design apparatus, and all the leisure I had for ten years was given to the subject.

These researches did not originate the use of the cold bath in fever, but they put it upon the final scientific basis and made the treatment universal. As long ago as 1820, if I remember aright, a certain English doctor's children had scarlet fever, and he locked himself in a room with them and used the cold bath, in spite of the protest of his wife and the neighbors. This experience did not, however, lead to the habitual use of the cold bath in typhoid and other fevers with high temperature. I believe that my first case was that of a professor in the Medical Department of the University of Pennsylvania, who put himself under my care. He had an extremely high temperature and was apparently unconscious, but as I lifted him into the bath he suddenly opened his eyes and said, "Doctor, this is the only treatment of typhoid fever that I have seen immediately followed by death." I knew that he had never seen the bath used, but I certainly had to get a good grip on myself to carry out my intentions. He eventually recovered; his distinguished career in this country and in Cuba is well known.

These were the two great researches of my life, although in practical value each is possibly equalled by the research that formed the basis of my address at the Tenth International Medical Congress in Berlin in 1890, and by the discovery of the therapeutic and physiologic action of hyoscine. The speech at Berlin had to be delivered without notes, because although originally

I had been allotted two hours, at ten o'clock on the evening before it was due I was informed by the committee that they could not afford to grant me more than one hour, owing to the fact that other physicians had overstepped their time. So I threw my manuscript into the drawer and trusted to my power of speaking. Two Jewish friends, very well and very favorably known in Philadelphia, one later a judge, gave me a wreath of the old Grecian laurel, saying, "We were frightened lest you would break down, but within the first ten minutes of your talk you forgot yourself and everybody but the matter in hand."

The research itself was on "The Treatment of the Accidents of Anesthesia," and showed that I had proved by experiments upon dogs the futility of much of the treatment then in vogue, and established proper methods of procedure. As a result of this paper the treatment of the accidents of anesthesia was effectively changed and improved.

The Berlin or German committee, toward the close of the Congress, gave a banquet to twenty-four prominent members of the Congress. That distinguished oculist, Karl Theodore, Grand Duke of Bavaria, presided; next to him sat Paget; and I was seated on Paget's left. Late in the dinner the Grand Duke came to me, put his hand on my shoulder and talked with me, told me that he was obliged to leave early the next morning to take his sister, the Empress of Austria (who was afterward assassinated) to some German bath; and spoke in the most kindly terms of his poor patients. (He supported a hospital, as he was forbidden by his rank from doing private practice.) He then said, "I desire to converse with our guests individually, so, won't you take my place as chairman?" And thus, for half an hour, I sat beneath the royal insignia of Bavaria, and enjoyed an intimate conversation with Paget, one of the greatest medical minds which England has produced.

Unfortunately the convention was doomed to end in a tragedy. We were welcomed on arrival at the main stairway of the hall by a doctor who seemed to know every language under the sun, and, always recognizing the nationality, addressed each guest in his

own language, apparently as fluently as if he were speaking German. To this man, also, was given the general management of the whole Congress. Next day, after the end of the Congress, while I was walking in the street, a head was suddenly thrust out of the window of a passing carriage, and a voice called to me: "Wood, Wood! my poor head, my poor head! The convention has been too much for me. I am now *en route* for your country!" When next I heard of him, some months later, he had become insane.

My attention was attracted by a rather acrimonious controversy in the European medical press concerning hyoscyamine. There was on the market an impure form of hyoscyamine, so-called, a blackish liquid, and also the pure crystalline hyoscyamine. Studying the current literature, it became apparent that impure hyoscyamine was many times more potent than the pure. I wrote to Merck, asking if he had ever chemically examined the impure hyoscyamine and had obtained anything out of it except hyoscyamine. It appeared that his chemists had isolated an alkaloid which they called hyoscine. This I studied, first thoroughly on dogs, then on myself, then on my wife, then on patients, and published the results; later I received a note from Merck, offering to furnish me without charge any product he had and which I might want for experimentation; also he offered, if I had any chemical research in contemplation, to put all the chemists I needed at my disposal.

My last research was upon the action of alcohol upon the circulation. From studies upon the isolated frog's heart as well as upon dogs the conclusion was reached that in small amounts alcohol does stimulate the heart, but in larger amounts diminishes the heart action. Thus it was found that one-quarter of 1 per cent. of alcohol in the solution increases the action of the isolated heart of the frog; that in mammals its influence is of similar nature; but that in all cases, if in at all sufficient quantities, it dilates bloodvessels, this dilatation being probably due to depression of vasomotor centers; that in all probability it has no action on the brain except in large amounts, when it acts as a paralyzant,

the mental exhilaration which follows when the drug is taken in small amounts being due to the increase of the blood in the brain and to the rapidity of its circulation.

I may mention that for various of these researches I was given the Boylston prize, the Warren prize awarded in New England, and a special prize offered by the Philosophical Society of Philadelphia.

I may conclude by saying that from 1868 to 1899 I published in various journals fifty-four papers on "Experimental Researches in Pharmacology, Physiology and Pathology," including one by special request from Germany, which was published in the *Festschrift* of Rudolph Virchow.

Between 1863 and 1902 I published one hundred and forty-three researches and studies in various branches of clinical medicine, pathology and therapeutics. In these researches I should acknowledge that I not rarely had a younger man to assist me, as is shown in my Bibliographic Record; but I believe I never failed to give my assistant sincere acknowledgment of his services.

In my earliest researches the condemned dogs of the public pound furnished the material. This was, however, stopped by the intervention of the Philadelphia Anti-vivisection Society. I went to see a prominent member of City Councils about the matter, and he said, with a well-worn oath: "You are certainly right, but I have business to do, and at ten o'clock a lady comes to my office and talks for an hour; at eleven o'clock she is relieved; and so on, day after day; and I cannot assist you without giving up my private affairs." At first I was nonplussed, but I soon designed a buggy, which could turn in its length, having a box in its rear; and owning a horse that had been trained for the race-track, my colored coachman and I would drive through the purlieus of the city until we saw a homeless cur, which I seized by the back of the neck and locked up in the box, and in a moment we had whirled around the next corner and no one the wiser. After a time it became known that dogs would be bought at the University and we had no further trouble for a supply.

I want to say here that I have always been very fond of well-

bred dogs, and have owned a number of them, and that in my experimental researches I never used one. In all my researches requiring animal experimentation all proper methods to prevent pain and suffering were utilized. Many times I have had to meet members of the American Anti-vivisection Society before a Legislative committee, or perhaps the whole Legislative body, and never have I failed to check their mischievous designs.

In 1874 appeared in the Philadelphia *Medical Times* my first published medical lecture, followed by thirty-one printed in journals in all parts of the United States.

An amusing experience was the following: When I was very young, to my utter astonishment, I was asked by the Associated German Societies of Philadelphia to deliver an address on the life of the great Humboldt, as part of their celebration of the one-hundredth anniversary of his birth; but the celebration continued all day, and other attractions had their effect. I had the pleasure of delivering my address to an audience of six persons, in a large dark hall. Nevertheless, the newspapers made it all right, for the next day they said the hall was crowded by a brilliant audience, and printed the address in full.

Medical Jurisprudence and Toxicology

During my life I had quite an extensive practice in medical jurisprudence, extending over five states. Once the judge, the district attorney and the attorney for the prisoner agreed to leave to my written statement, without oath, the determination of the sanity of the convicted criminal, concerning which all of them had doubts. I replied that if on examination I had any doubts of the mental condition of the prisoner I would refuse to give an opinion without the assistance of some other doctor of repute; but on examination I was satisfied that the patient was sane, and so the judge gave sentence.

On the subject of Medical Jurisprudence and Toxicology I published twelve articles in various journals.

What is needed to make a first-class medical expert is an

expressionless face and bearing, a complete knowledge of the subject, and the power of quick thinking and ready utterance. Sometimes a bitter wit is not out of place. I remember an accident case which had both a surgical and a medical side. When I was cross-examined, a personal friend, a surgeon of great repute, led by his desire to see me in the mire of a surgical hole, came forward and sat by the lawyer who was conducting the cross-examination. His intention was to entrap me through my surgical ignorance. The first question put to me was half surgical and half medical. I answered that when I went on the stand I told the Court that I knew no surgery and would not answer any surgical question; further saying to the attorney, "That, sir, is a surgical question; and when you are a little older you will perhaps learn that the difference between an American neurologist and an American surgeon is that the neurologist knows what he does not know as well as what he does know." The lawyer responded, "Is your specialty entirely different from that of a surgeon?" I replied: "Certainly, sir. I am a brain-worker; the surgeon works with his hands." Putting their heads together, I was told, "That will do, sir;" and went back to my seat, clothed in a most becoming garb of humility.

Books and Periodicals

I have written six books, exclusive of the *Dispensatory*, the descriptive titles of which are printed in the Bibliographic Record.

The original title of my work on therapeutics was, "*A Treatise on Therapeutics, comprising Materia Medica and Toxicology, with Especial Reference to the Application of the Physiological Action of Drugs to Clinical Medicine.*"

The most learned, thorough and generally acknowledged superior book on therapeutics which existed at that time was that written by Alfred Stillé, and in order to show the radical differences between the thought-basis of that book and my own, I venture to quote the following extracts from the prefaces of the two books, making at the same time my acknowledgment of the

generosity of Professor Stillé, who allowed me to use his own library, which was then the most complete one in this country upon therapeutics: this, too, though he knew that the book which he was assisting me to write would be the competitor of his own work.

PREFACE TO PROF. STILLÉ'S BOOK

To experience, then, we must turn as the ultimate and decisive arbiter of all questions respecting the curative virtues of medicines, feeling assured that whenever the particular application of a remedy can be sustained by the testimony of the great physicians of successive ages, our employment of it possesses the highest possible sanction. In this conviction, the reader of the present work will, it is hoped, find a motive and a justification for the citations and references with which it abounds.

The following is the extract spoken of above from the first edition of my work:

The old and tried method in therapeutics is that of empiricism, or, if the term sounds harsh, of clinical experience. As stated by one of its most ardent supporters, the best possible development of this plan of investigation is to be found in a close and careful analysis of cases before and after the administration of a remedy; and, if the results be favorable, the continued use of the drug in similar cases. It is evident that this is not a new path, but a highway already worn with the eager but weary feet of the profession for two thousand years.

That very much has been thus accomplished it were folly to deny. Leaving out of sight the growth of the last two decades, almost all of the current therapeutic knowledge has been gained in this way.

Therapeutics developed in this manner cannot, however, rest upon a secure foundation. What today is believed is tomorrow to be cast aside, certainly has been the law of advancement, and seemingly must continue to be so. What has clinical therapeutics established permanently and indisputably? Scarcely anything beyond the primary facts that quinia will arrest an intermittent fever, that salts will purge, and that opium will quiet pain and lull to sleep.

To establish therapeutic facts the profession clings as with the heart and hand of one man, clings with a desperation and unanimity whose intensity is the measure of the unsatisfied desire for something fixed.

Yet with what a Babel of discordant voices does it celebrate its two thousand years of experience!

This is so well known that it seems superfluous to cite examples of the therapeutic discord; and one only shall be mentioned, namely—rheumatism. In this disease, bleeding, nitrate of potassium, quinine, mercurials, flying blisters, purgation, opium, the bromides, veratria and a host of other remedies, all have their advocates clamorous for a hearing; and above all the tumult are to be heard the trumpet-tones of a Chambers, "Wrap your patients in blankets and let them alone."

Experience is said to be the mother of wisdom. Verily she has been in medicine rather a blind leader of the blind; and the history of medical progress is a history of men groping in the darkness, finding seeming gems of truth one after another, only in a few minutes to cast each back to the vast heap of forgotten baubles that in their day had also been mistaken for verities. In the past, there is scarcely a conceivable absurdity that men have not tested by experience and for a time found to be the thing desired; in the present, homeopathy and other similar delusions are eagerly embraced and honestly believed in by men who rest their faith upon experience.

Narrowing our gaze to the regular profession and to a few decades, what do we see? Experience teaching that not to bleed a man suffering from pneumonia is to consign him to an unopened grave, and experience teaching that to bleed a man suffering from pneumonia is to consign him to a grave never opened by Nature. Looking at the revolutions and contradictions of the past—listening to the therapeutic Babel of the present—is it a wonder that men should take refuge in nihilism, and like the lotos-eaters dream that all alike is folly; that rest and quiet and calm are the only human fruition?

Since the profession has toiled so long and found so little, if further progress is to be made we must question the old methods and search out new ones, which happily may lead to more fruitful fields. In the ordinary affairs and business of life, when anything is to be accomplished, the effort always is to discover what is to be done, and then what are the means at command. A primary knowledge of the end to be accomplished and a secondary acquaintance with the instruments are a necessity for successful human effort; and until the sway of this law is acknowledged by physicians, medicine can never rise from the position of an empirical art to the dignity of applied science. Until within a comparatively recent period, it has been impossible to comply with this law. But, through the advances made by the pathologists and by the students of the natural history of disease, we are fast learning the methods in which Nature brings the body back to health. When this is done—when disease

is thoroughly understood, we shall have wrought out the first element of the problem, shall have complied with the first requirement of the law.

A very flattering review in the *American Journal of the Medical Sciences*, written by Prof. E. H. Clarke, of Harvard University, gave my book immediate standing, and its success was such that thirteen large editions were published in the next thirty-three years. The amount of work required in the preparation of a new edition may be understood when I state that I once kept tally of the number of the papers studied, and found that it was eight hundred, including in its range three languages.

I do not mean to make the claim that my book was the first or only one which had given more or less prominence to the study of the physiological action of remedies, but I believe it was the one that first made this the basis of the book itself, and became in this respect the beginning of the modern study of therapeutics. The epoch-making discoveries of Pasteur, the wonders of antiseptic surgery, the modern growth of the experimental study of remedies, have all, in fact, been due to the recognition of the truth that only by the correlation of the facts obtained in the experimental laboratory with those which come from the bedside of the sick is true therapeutic progress to be made.

The first pharmacopœia of the United States was published in 1820; but in 1830 two conventions for the revision of the pharmacopœia were held, one in Washington and one in New York. These resulted in the issuance of two pharmacopœias, which became rivals for popular favor, neither of them being supported by legislative enactment. This led to much confusion and the country was little better off with two than it would have been with no pharmacopœia. In order to obtain general recognition of the Washington pharmacopœia, Dr. George B. Wood, who had been a delegate to this convention, wrote, in conjunction with Dr. Franklin Bache, a commentary on this pharmacopœia under the name of the *United States Dispensatory*. Dr. Wood had no thought of commercial success in this book, but it led the physicians and druggists of the United States to recognize the authority

of the Washington convention and the New York pharmacopœia was never republished. Partly as a tribute to his work in obtaining general recognition of the pharmacopœia, and partly because of his standing in the medical profession, Dr. Wood was elected president of the convention in 1850, which position he held during the remainder of his active life. In 1880 I was accorded the same honor and served as president of the convention for twenty years.

The United States Pharmacopœial Association, as devised by Dr. George B. Wood, has never been assailed except by a famous and very influential druggist, who attempted to have the American Medical Association take charge of the production of the pharmacopœia. In a two-hour speech he made such an impression upon the convention that, when I got up to speak in opposition to what he had said, my friends took hold of me and said, "He has such a large majority in favor of his plan that you will only make a fool of yourself by opposing it." I replied, "Let me go, for the Lord hath delivered my enemy into my hands." The result of my hour's speech was that in the next issue of his weekly journal, the druggist said that "he had the convention" until Dr. H. C. Wood, a young, unknown man from Philadelphia, in a way that to him was inexplicable, melted down his majority. The United States pharmacopœial convention has met every ten years since the early days of Dr. George B. Wood.

By the will of my uncle the ownership of the *United States Dispensatory* was left to me, and the contention of the Bache family, that they owned it in part, was finally settled by agreement. After this matter was adjusted I gave to Professor Joseph P. Remington a share in the ownership of the book, making him at the same time the editor of the pharmaceutical matter contained in the work. During the preparation of the twentieth edition, in 1918, Professor Remington died, and as the result of agreement between myself and the family of Professor Remington, my son, Dr. Horatio C. Wood, Jr., became the owner of the copyright of the book; and since the completion of the last edition the sale has so continued that it is probable the work will represent three generations of the Wood family.

The *Dispensatory* is not a book that requires genius or originality, but an extremely wide and thorough knowledge of drugs and of their literature, the power of seeing the essentials of a subject, the ability of writing very concisely and a willingness to do enormous labor. If the sale of the latest edition during its first year may be taken as a criterion, the present hold of the *United States Dispensatory* upon the professions of the world is as great as it has ever been. Previous single editions have reached forty thousand copies.

The extraordinary, widespread reputation of the *United States Dispensatory* is illustrated by the fact that when I went to Japan the apothecary at Vancouver refused to allow me to pay for medicines, on the ground that I had been the basis of his success in life. On the Canadian Pacific steamer, almost the first thing the doctor said was, "I have just discovered a book which I did not know of, a wonderful book," and so on. I asked what it was. He said: *The United States Dispensatory.* Did you ever hear of it?" I replied, "Yes, I have heard of it." In the drug-store at Yokohama it was lying on the counter. To it I probably owe many letters from central Africa, most curious in their mixture of total ignorance and basal knowledge. Witness the following:

AUGUST 3D, 1915.

DEAR SIR,

Please send me the price list of your medicine for learning how to work arithmetic, how to speak correctly in the public, so do not delay it at all, because I have brought many of my friends to see it, and we are waiting you, for your examples; let me know your charge at same time, and send a p. o. amount for it. If pills or book you must put on the directions, and know it perfectly, so I am now being in the school, and do not neglect at all.

I am Sir, your obedient Servant
J. K. ESHUN.
Sabin House.
care Isaac Idan,
post office Salt Pond.

Believe me,
yours truly,
J. K. ESHUN.

The last African letter which I received is so interesting as a revelation of the ersttime wild central African's character when

tamed a little, that I insert it here. Apparently the writer is employed on the English railroad, hence the English name, A. C. Nelson.

from A. C. NELSON

A. C. Nelson,
care George Codjoe
Account Office,
Railway station, Accra.

Dear
Sir,

Your name & address have been highly recommended to me by certain friend of mine, that your are the best Talismans, Rings, Pomades, & ink manufacturers. I therefore entreat you much to forward me one of your illustrated catalogue to help me in dealing with you. I am mentally weak, therefore I need your help.

Awaiting your early good news with many thanks,

7/9/16.

I am your

A. C. NELSON.

The genuineness of these letters is shown by the fact that they have on the envelope not only the African stamps but also the marks of the British censors in the interior and on the coast.

In 1872 I had to depend entirely on my own exertions for the support of my increasing family, and was often very anxious concerning my pecuniary condition. I was sent for by J. B. Lippincott & Co., and was offered the editorship of a new journal to be published under the name of the *Philadelphia Medical Times*. I said I would be very glad to accept such an appointment and asked what the renumeration would be. On being told it was $1000 a year, I said I would take it for $1500. Mr. Lippincott said they could not afford to pay such a sum. I replied that was none of my business, that they could get other editors; and so left the office. They did get another editor, but at the close of the year offered me $1500 a year for editing the new journal, and thus it came under my care until its suspension in 1880.

Subsequently I was asked to take editorial charge of the *Therapeutic Gazette*. Everything between me and my publishers was satisfactory until one day we disagreed upon a question of ethics and also upon the subject-matter of my editorials. Inasmuch as I declined to accept their view of the situation and follow their wishes as to the character of the editorials, at the end of the year my contract was annulled.

Business Ventures

It is rare for a busy doctor to have financial recognition, and it is perhaps worthy of mention that I was elected, without solicitation or even knowledge on my part, a director in the West End Trust Company in 1895, and reëlected yearly until 1909, when I resigned on account of ill-health.

Most doctors fail to a greater or less degree in making investments, and I desire to point out that science is as applicable to this as to almost every other thing that is honest. The doctor not rarely looks first at the dividend end and does not make a scientific study of the whole problem.

One day it was told me by a mutual friend that a neighbor, a doctor who enjoyed one of the most lucrative practices in the city, said to him, "I can make plenty of money but I cannot keep it like that man," pointing his finger to my house. Now the fact is that the first ten thousand dollars I saved was lost through the counsel of two men, esteemed among the highest of Philadelphia's financiers, and I believe perfectly honest in their advice. After much distress, I sat down to think it out; and it came to me that investments, not of a gambling character, should be determined by exactly the same mental process as a scientific investigation; though of course there always must be an element of chance to take into consideration. For instance, suppose a man has a sum of money to invest, and a new railroad is to be built. There should first be made a study of the population about the present terminals of the railroad, and then a study of the nature of the new line which is to be built, and of the present

population and the character of the new land to be opened. After this is done the principles of the decision become that of the scientific problem; with the element of chance coming from the character of the men who are to build the railroad and to be its managing directors. This chance could by inquiry be reduced to a minimum, and then the investment made according to the result of the whole study.

I may add that I was accustomed to obtain the advice of half a dozen financiers, and strike an average of their opinions as an aid to my final decision.

I once was introduced by a Philadelphia lawyer to a noted New York banker, and our five minutes of conversation made me perceive that he was about to enter upon a great speculation, and I determined to follow him. The great difficulty in the case was to know when the banker was to drop his speculation; but watching closely I saw one day he was making a change in his methods, and I immediately telephoned to sell all my shares of that stock. The result was that, though I lost a little money at the time of selling, on the whole I came out with a surplus of $30,000. Thinking over the matter, however, for two or three days, I determined never to make a speculation again: first, because it was only a form of gambling, and therefore opposed to my religious principles; second, because to speculate successfully requires that a man shall pay attention to that and have no other business. Even with the utmost care the speculator may be injured or ruined by superior talent in another man.

Vacations

My early summers in the country fostered my love for the lonely places of the world and also the love of hunting, and so it came to pass that my expeditions in later life were from Lands End in Nova Scotia to the far edge of the Rocky Mountains, involving often much discomfort, but always giving to me an infinitude of joy.

I have never met with any of the North American cats, nor with the grizzly bear; but I have shot Eastern rabbits, so called, jack-rabbits, American porcupine, antelope, black-tailed deer, white-tailed deer, brown bear, black bear, caribou, wapiti and moose (the elk of Scandinavia from time immemorial); and among the fur animals, raccoons, mink and beaver, and have watched with great pleasure the otter playing with her young and the little beaver swimming about my canoe when I was trout-fishing. The opossum I have caught with my hands, and watched with glee his "playing possum," *i. e.*, pretending death, so that he could get a chance to get me off my guard and make a run for for it. The man who has never eaten opossum, cooked by an old black "mammy" or one of her pupils, has gastronomically never lived. Once I gave a supper party, with all the ordinary dainties; but the day before I happened to see an enormous opossum in the market, and had it put on the table as the first course. Everyone exclaimed on its excellence, and the plates came back until nothing was left but the bones. No one knew what he was eating, but a doctor born in Maryland remarked, "If that creature was not so big I should say it was an opossum, but no opossum ever grew as big as that."

The last time I fired a rifle was in northern New Brunswick. We were lying hidden on a lake, half an hour after sunset, in a drizzling rain; so dark was it that it was almost impossible to see the sights of our rifles. The guide was calling moose, when suddenly he whispered, "There is a moose standing in the woods on the opposite shore." After long searching I made him out, and asking the guide the distance, fixed my rifle-sights for two hundred and fifty yeards. I shot and the moose immediately came out on the shore and began walking around and around. I shot twice again without to me apparent effect, and said to the guide, "I am no good, you fire." After he had done this twice, around and around still went the moose. I then shot, and he dropped. We went back to camp, and I told my son we had shot a moose. He said, "You did not shoot it, the guide did." Our post-mortem showed (our rifles being of different calibers) that all

four of my shots had inflicted fatal wounds, the last breaking the animal's neck; whilst the guide had only grazed the skin once.

With the great surgeon, the late Sir Victor Horsley, I have successfully hunted the preserves of Devonshire, a privilege which I owed to a maiden lady who one day entertained us at dinner. Of course, I was all politeness and gratitude; but when she told me that she had ninety-six dogs (as pets) in her London home, I thought "elderly English single women need company."

Another time I was the guest of Professor Fraser, of the University of Edinburgh, who had rented a preserve opposite the island of Skye, on the mainland. Here we shot grouse, and in certain warrens, rabbits. Often we would look for seals in the sound, always carrying a rifle. One afternoon five magnificent stags came out on the mountains on the island, and Professor Fraser began to urge and guy me for want of spirit for not going after a trophy. Finally my blood go so hot I said that if the gillie would go with me I would try my luck. By the time we got to the top of the island it was dusk, and thinking I saw one of the stags I rose from my creeping position to shoot; the gillie said, "Don't shoot; the only way to get the head is to kill the animal dead, and I'll come back at midnight and get the head for you." So after painfully crawling closer I rose to shoot, and saw that my supposed stag was a bay horse; at the same time the gillie cried: "See the stags running, higher up on the mountains. The keepers have seen us and are after us." If any two young men ever went down a precipitous mountain in haste that was the time, but we got into the boat in safety, and were rowed rapidly into the gathering darkness.

Another vacation I was staying at a boarding-house in Norway about a hundred miles from the Arctic Circle, with a wild mountain plateau about a thousand feet above us, and on it numerous forests, but none of the trees of a height greater than six feet. Here we would, on some days, shoot over one hundred pounds of large willow grouse (so called), to carry which we always had a man with us. After I got home I received from the Norwegian Embassy at Washington an official letter, marked, "Diplomatic

Correspondence, 2010," stating that I had been fined by the magistrate in Norway for shooting on government ground without a license, and would I therefore pay the fine. Not to be outdone, I headed my letter, "Diplomatic Correspondence 2050," and asked why I had not been summoned to the magistrate and given a chance to plead "not guilty," and to be represented by a lawyer. It took five or six letter to make the minister understand that I was guying him; when the "Diplomatic Correspondence" ceased. My excuse for my seeming dishonesty is that I had been told by my landlord, who always shot with me, that the land was his, and therefore I did not know any impropriety was involved in our sport.

The first trip I made to the Yellowstone Park was at the request of the Northern Pacific Railroad Company, which wished to have a medical opinion concerning the value of certain saline springs some little distance this side of the Park, and to my astonishment they offered me, if I would accept, a trip from St. Paul, Minn., not only to the Park but around and through it. One of our party chanced to be a half-wild Westerner of great ability, and he got an order from a high official of the railroad giving us the right to ride upon the cowcatcher of the locomotive. It was the most curious and exciting experience to go at the rate of forty miles an hour, with your feet about eight inches above the ground and your seat on one of the higher iron bars, holding on as best you could. The track at that time was not fenced in, and we passed through a herd of cattle, one of which escaped my legs by not over two feet. Then the engineer came and told us to get into the cars. We refused and showed our letter, and he started again. But not long after he stopped the train, came out to us and said in the classic vernacular of the West, "The president and all the officials may go to hell, but this train does not move until you take your seats in the cars." We saw he was in earnest and meekly went back and took our seats as directed. Curiously enough, the Westerner, who was most of the time threatening to throw me off, became superstitiously afraid in the Park when, at night, I took him among the spouting geysers.

It was on this trip that I had an amusing experience with a Mormon camper. This man was taking his large family on a vacation trip through Yellowstone Park; with a horse and wagon to carry their goods and chattels, they would travel by day, and at night pitch a tent beside a stream where there was pasturage for the horse. I was standing on the edge of what is called "Hell's Half-acre," contemplating the desolation and the vapors that rose from the ground, when this Mormon came up and said to me, "Stranger, can you tell me where I can find a camping ground around here?" I looked at him in my most solemn manner and then began, "Stranger, if in this land of desolation blasted as by the hand of divine wrath, pouring forth sulphurous fumes like the gaping mouth of Sheol, where one can almost hear the wails of souls doomed to an eternity of remorse"—and so on for a space of five minutes. As I proceeded his eyes opened wide as saucers, his jaw dropped and when I had ended he gazed on me for a moment in silent astonishment and then said in a voice scarcely above a whisper, "Christ Jesus! Where did you learn to talk?" and, turning on his heel, disappeared.

My vacations were attended with several narrow escapes from death. A rather exciting, possibly dangerous adventure, happened once in my earlier days when hunting in the Adirondacks. At that time night hunting with a "jack" was legal. Jack-hunting consists in being paddled by a guide noiselessly over the lake at night, while the hunter sits in the bow of the boat or canoe behind a large piece of bark, to which a small lantern is attached, making it possible to see deer without being seen by them. One night, while hunting by this method, we were close to the edge of the lake with the precipice above us. For some reason a deer came bounding down, springing from the edge of the precipice, clearing our boat by only a foot. If he had struck the boat there would have been a sorry mix-up, as a full-grown buck is capable of giving a good deal of trouble when cornered. Later in the night I shot at a deer and found the body the next morning floating on the lake; but whether this was the same animal or not we were never able to tell.

In one of my trips to the Rocky Mountains I had an experience, the results of which might have been very serious.

Horses at that time were divided into three classes: unbroken, which sold for five dollars each; broken but of ordinary character, which sold for ten dollars each; very good horses, which sold for fifteen dollars each. One day some hundreds of horses were driven past our camp by a lot of men, who offered to exchange their fifteen-dollar horses for our ten-dollar horses. I was about to accept when the guide said, "Don't you do that or you will get into very serious trouble." A few hours later a body of men with fury in their faces rode up, saying, "Let us see your horses." The guide took them out, and they came back quieted in manner and with the statement that we evidently had nothing to do with the stealing of their horses.

In the American desert, twice, I have come close to dying of thirst, once suffering almost the last agonies. I have had a horse fall with me over a low but abrupt precipice, destroying his own legs, but I escaping injury by jumping from the saddle when he started to fall, and alighting solidly on my feet unharmed. I have been hurled over the head of a galloping horse on the prairie, because its feet went down into a concealed badger's hole. And once, a horse, seeing an opening between two trees and not seeing that a cross sapling would take me in the breast, bolted and knocked me violently over his tail, to alight on a big boulder lying in the wood. But never has permanent serious injury resulted. So it happens to the children of men, and we call it fate.

In December of my fifty-ninth year I began to have irregular heart action, and went to the doctor who was rightly considered the best cardiac specialist in Philadelphia. He said, "Professor, I am sorry to have to tell you that you have disease of the coronary artery and cannot live more than two months." I said, "Your diagnosis is rot, but if it be correct I am not going to be two months in dying." The next day there came up a severe thunder-storm, and I rode seven miles in the Park, when the dust was so thick that I could not see the front wheel of my

bicycle, and back again, feeling refreshed. Nevertheless, weakness increased, and finally, after sanitarium treatment and treatment at home by various physicians of high renown, and their general inability to come to any conclusion as to the exact diagnosis of my case, a consultation of six doctors agreed in advising me to go to a certain spring in northern Germany. I knew their instructions were wrong, but apparently agreed; and wrote at once to Dr. Lauder Brunton, of London, giving him an account of my case, and asking him to reply to me at Genoa. He did so, saying that to go to north Germany for the winter would kill me, that my best chance was to go to Helouan, a famous hot spring in the Egyptian desert, and put myself under the care of the English doctor there. This I did.

The treatment at Helouan, besides the following of various minor instructions, consisted in taking daily a bath for fifteen minutes in running hot water, the while being very vigorously massaged on one side by a trained German masseur, and on the other side by a huge negro whom the masseur had trained. I recovered sufficiently to go up the Nile to the First Cataract.

The passage up the Nile was most beautiful, but there are only two incidents which seem to me worth the telling, because they illustrate the differences between the two great branches of the Anglo-Saxon stock. At table I sat next to an English lady, well-born, well-bred and attractive, probably about eighteen years of age. It so happened that one evening we had toast upon the table, and she turned to me and said, "Do you have toast in America?" The temptation was too strong for me, and I said, "No, what is toast? "That is toast," was the reply. Then, with my most innocent manner, I answered: "What is it made of? Is it good to eat?" She said, "Yes, it is made of bread; try it." The next day, to a friend of hers sitting opposite to us, she said: "Fancy, they don't have toast in America! This gentleman had never seen it until I introduced it to him yesterday."

The second incident was with a highly cultivated young English Hebrew lawyer, who had just been offered the post of first assistant legal counsel of the Viceroy of Egypt, and was to

me the most interesting man upon the steamer. We talked many hours together, and one day he said: "And you a University professor! You have interest in and know something about almost everything. But when we go to Oxford or Cambridge we find each professor knows his Latin, Greek or mathematics to the end, but knows nothing else. No wonder the educated American youths are so much broader in their knowledge of and outlook on the world than are our young man."

English men and their families, who had gone from England early and made fortunes in the colonies, were very abundant because of their hatred of the English winter after they had retired to their native country. They were very different from the general English people, much more like Americans. It chanced in a Paris boarding house we sat opposite a family whose members spoke English, and we had much discussion as to what they were. Most of the party thought they were American. I said, "No, they are not Americans, but what they are I cannot tell." Later we found out they were Cape of Good Hope people.

Following the Nile journey, I went to the Tyrol, and then home; and with utter lack of commonsense went back to work.

I had been elected president of the College of Physicians of Philadelphia while absent in Egypt. The first official act after I took office was an address in which I demonstrated the necessity of an increase of the size of the building for the College, if the College were to prosper and the Library be maintained; also pointing out the only available site in the city of Philadelphia. The College agreed as to the necessity for the new building, but four years of constant parliamentary battle were necessary to get concord as to the proposed site. The money for the building was collected by a committee, and especially by Dr. S. Weir Mitchell, including the one hundred thousand dollars which he obtained from Mr. Carnegie; and when the College was finally built all the Fellows were apparently well satisfied.

The second breakdown of my health occurred in 1906 and I have been ill ever since, although I have tried sanitarium treatment and been under various doctors of the first rank, but no

one has been able to make a satisfactory diagnosis or to do me any substantial good.

Finally, I may say that the long bitter years of suffering have taught me to wish for speedy death, with hope and faith that the sacrifice of Christ and the mercy of the Lord would bring me to Beatitude. It is many years since the Professor of Hebrew in the Philadelphia Episcopal Seminary convinced me that the modern conception of Hell was due to a mistranslation of the old Hebrew Bible, which has been confirmed by other great linguists; so I have no fear of eternal punishment or death. I recognize that he who says he has faith thereby confesses he has not knowledge; on the other hand, it is unthinkable to me that an all-wise and all-merciful Creative Being should condemn to eternal torture millions of men and women who, without choice of their own, have been born into an heredity of vice and an early environment of sin which shapes their characters almost as an iron mould shapes a plaster image. A reformatory period after death is, however, thinkable, and perhaps this is what the Catholic Church is groping for in its ideas of Purgatory; but never can I imagine an eternity of suffering. Therefore, I can see no worse possible final fate in death than an escape from a life of suffering to an eternal sleep. And so, striving during life to do the right as it is given us to see the right, may we go out with the cheery cry, "What of the night, brother, what of the night?" Listen to the Book: "And now abideth faith, hope and charity, these three, but the greatest of these is charity." To my understanding, he who has charity is honest intellectually as well as morally, stands against evil and oppression, and also with kindness and sympathy alike toward the highest-born and the strongest, and toward the lowest and weakest. But let him who desires to know the whole fulness of charity read 1 Cor., 13, and blessed is he who in verity bases his life thereon.

DR. H. C. WOOD AS A MEDICAL TEACHER

By G. E. de SCHWEINITZ, M.D.

Success in the art of teaching depends not alone upon familiarity with the subject, but also, and in large measure, upon an ability to expound it and to excite the interest of those who are instructed and to arouse their enthusiasm. Dr. Wood failed in none of these essentials.

He who has been well taught is apt to teach well; he passes on the results of his training. Dr. Wood's boyhood studies, wisely guided, put him as time progressed into possession of an excellent acquaintance with the classics, a reasonable knowledge of French and German, a thorough grounding in mathematics, and created an interest, faithfully maintained, in the construction and derivation of the English language.

His devotion to the natural sciences—paleontologic, morphologic and systematic botany and entomology—fostered by men no less than Joseph Leidy and Louis Agassiz, quickened his naturally excellent powers of observation, improved his judgment in relative values, increased his skill in using instruments of precision, and contributed an educational training which greatly increased his power with respect to those matters to which he was to devote the best years of his life.

In his early medical career he was a renowned "quizmaster" (which occupation always furnishes an education in the profession of teaching of great value) in medicine, materia medica and chemistry. For ten years a Professor of Botany, he literally, in the quaint words of the Founders of the College of Physicians of Philadelphia, of which institution in later years he became

President, "searched for Medicines in our Woods, Waters and in the Bowels of the Earth." He became the master therapeutist of his day and generation, and the master exponent of the physiologic action of drugs, and conveyed to those who came to him for instruction the knowledge of this well-nigh new science in a vigor of language, written and spoken, which has rarely been equalled and never excelled.

But Dr. Wood's drilling for the duties of a teacher of medicine, and in special degree of pharmacology, as well as of neurology and medical jurisprudence, was not alone concerned with the acquisition of knowledge and the tuition of students. He rarely "broke training," even in vacation days. He constantly was putting himself through a species of self-examination, asking himself questions, giving himself problems, thinking out the answers and formulating the solutions which seemed to be required in the circumstances. All scientific men, of course, engage in similar self-quizzing, being a mental preparation for a public record of their work. But Dr. Wood not infrequently went a step further—a step whereby he attempted to ascertain whether the answer he had given to his own question was sufficiently accurate to receive "a passing mark," not from a colleague of equal training and with similar interest, but from a student selected from a class that later was to share this knowledge. To the student thus selected he would propound his question or state his problem. Failing to receive the correct answer, he was wont to restate the problem with every endeavor to clarify the phraseology. Still failing to elicit an adequate reply, he would introduce his own answer, repeat it, if necessary, reduced to simpler terms (and be it remembered Dr. Wood was not usually a patient man) until the listener grasped the meaning. Thus he instructed not only the student, but himself, in that he ascertained the most satisfactory method of presenting the subject-matter to the pupils who thronged his classroom. He matched his mind with theirs to their mutual advantage.

This habit of his was somewhat evident in the examination-room (in those days examinations were almost always verbal)

and gave him the reputation of being a "hard examiner," and one prone to ask "catch questions." It is true that he was a trifle overfond of testing the mental alertness of his hearers, but not with the object of bringing into embarrassing prominence his own brilliancy with their insufficiencies, but for the purpose of quickening their mind-activities and stimulating the work of prompt thinking and accurate observation. The writer, because of a long and intimate acquaintance with Dr. Wood, one of the most valued assets of his life, is persuaded that he did not attempt to force his students "to go along with his mind," but when satisfied that he was clearly right, insofar as that was humanly possible, he invited companionship with his thought, his reasoning and his conclusions.

Sometimes Dr. Wood exhibited a certain timidity in his conversation, in his lectures, and in his discussions, one might almost say a form of self-depreciation, which unhappily, in later years, when the strength was beginning to go out of him, was on more than one occasion disastrous. But it was evident, too, at times, in the days of his full vigor. This was at first very puzzling to the writer, knowing so well and admiring so greatly Dr. Wood's intellectual brilliancy and vigorous personality. Soon it became plain that in many instances it was an evidence of his kindly nature, and represented a deliberate technic whereby he strove to lessen the embarrassment of his juniors, usually junior students who were prone to regard him as a formidable man, and hesitated to answer lest they should display unforgivable ignorance.

His method, often employed chiefly during clinical lectures in neurology, of punctuating his remarks with keen questions, and of making the student in part the examiner, by directing him, for example, to test the pupil reactions, note facial asymmetry, try the reflexes, etc., was a step in advance of the usual technic of that day, whereby the pupil was only a long-range examiner on comparatively far-off benches. To be sure, certain opportunities in ward-class teaching, bedside examination and personal contact with the patient were not lacking, but practical instruction as we now employ and understand it was as yet in its early stages,

and many a student received his first and often his best lessons in the art of observation, observation of what Dr. Wood was wont to call "the surface play of disease," in these clinical lectures, or "clinics," as they were briefly called. His physical forcefulness, his mental alertness, his originality, his quaint and often picturesque language, lent an additional charm to these hours not readily forgotten by those who were privileged to enjoy them and to profit by them.

Dr. Wood's familiarity with the subjects he was called upon to expound in the classroom and in the clinic was based not alone upon an accurate knowledge of the literature and the records of other observers—with which, however, he was intimately acquainted and which he had codified and judiciously analyzed—but largely upon personal investigation. He combined happily the qualities of a researcher, a clinician and a practitioner. Therefore his students were guided to their tasks and to the solution of their problems along three important avenues. Although firmly convinced of the necessity of satisfying "the exacting conscience of the laboratory," as Weir Mitchell was wont to say, he never failed to weave into the fabric of his instruction, whether in pharmacology, therapeutics or neurology, lessons vitally necessary from the standpoint of the clinician and the practitioner.

In the early and middle period of his activities "the didactic lectures" held high rank, indeed, in many respects the highest rank in the medical curriculum. To be a "good lecturer" was tantamount to being "a good teacher," and in this regard Dr. Wood had few equals. Never a medical instructor of that day struck more telling blows against false doctrine, faulty interpretation and injudicious therapeutics than did this vigorous man—vigorous in mind and body, resourceful, imbued with the courage of convictions arrived at from conscientious investigation and earnest study, albeit he was gifted with an intuitive knowledge which at times was well-night startling.

Notable was his clear, captivating and convincing presentation of the subject-matter. His forceful and fluent language,

often punctuated with eloquent periods, held his hearers in rapt attention, rarely accorded by the medical students of that period, wearied as they often were with the strain of many sessions during the long day.

It is interesting to recall that "note-taking" on the part of the students in Dr. Wood's lecture-room was comparatively infrequent—a fact, it would seem, which indicates how real his power was of storing the minds of those who heard him with the lessons of the hour. It is true that his famous book, *A Treatise on Therapeutics*, was available, which fact, it may be argued, made note-taking unnecessary. But in other lecture-rooms, where the students had similar opportunities for text-book consultation, pad and pencil were conspicuously evident. It was Dr. Wood's gift so to impress the student that his memory became his note-book. Once he said, "I'd fling a cobblestone into the center of the classroom if I thought that would make the men remember what I believe they ought to know." This he doubtless never did, but literally he flung his sentences into the faces of the students, his interesting thoughts often being interpreted happily and strikingly in a few words. These epigrams have been treasured by those whom he taught, and have guided many a doctor in the art of healing the sick.

No one who ever heard it can forget the brilliant lecture on general anesthesia, wherein he contrasted the physiologic action and lethal effects of ether and chloroform, emphasizing the danger of the latter agent and the comparative safety of the former, closing thus: "Which shall it be, ether or chloroform? Remember, gentlemen, you can make artificial respiration, but you can't make artificial circulation." These words, spoken more than a third of a century ago, must not be weighed in the balance of present-day knowledge, and they, one may well suspect, have saved many a life. His denunciation of the reckless use of antipyretic drugs in the treatment of typhoid fever, then only too frequently employed, was potent in the reform of injudicious therapeutics. "Rather than that," he thundered, "send the doctor to the North Pole; trust to rest, quiet and diet." He was in no sense a therapeutic nihilist—quite the contrary. No one knew better

than he the value of the reduction of temperature by cold packs; witness his admirable researches in the management of thermic fever; also no one better than he knew the danger in these circumstances of these so-called antipyretic remedies, just as he recognized and condemned the evil influences of the coal-tar products, often so thoughtlessly administered in influenza. His therapeutic vision was not limited; not content with noting the primary effect of a drug, he thought wisely and reasoned carefully as to its secondary effects. He anticipated, both as a writer and a teacher, by many years the work of the laboratories of experimental surgery, on the fall of blood-pressure as an all-important phenomenon of surgical shock, and taught the value of atropine and heat in combating it. Our earliest knowledge of the excellence of strychnine as a respiratory and circulatory stimulant and of the employment of nitrite of amyl in convulsive seizures are due to his investigations.

Always he strove to improve the methods and rationale of drug administration and the application of remedial agents to the cure of disease. Fully he realized the responsibilities of a teacher of medical students in the preparation for the great work of those who are banded together for the relief of human suffering and the prolongation of human life. Original in conception and ingenious in technic, he was never reckless in the measures he utilized or recommended. As Hobart Hare, easily his most distinguished student, has said, "He did something that it is given to few men to do: he filled young men with enthusiasm for therapeutics as an art and a science, and he taught them to think, and by thinking to arrive at accurate conclusions."

No man with Dr. Wood's originality (in many respects he was a genius), knowledge, didactic and literary skill could ever confine his teaching to students who filled the benches of a lecture-room. His, of necessity, was a far larger audience, to wit, the medical profession. To this profession he conveyed his instruction in more than two hundred journal articles, not to mention essays, brochures and monographs. But most of all, the avenue of instruction in this regard was through his well-known book on therapeutics—more exactly, *A Treatise on Therapeutics, compris-*

ing Materia Medica and Toxicology, with especial reference to the Application of the Physiologic Action of Drugs to Clinical Medicine (first edition, 1874), which passed through fourteen editions, maintaining its position as a standard work. (The later editions in collaboration with his son, Dr. Horatio C. Wood, Jr.)

Almost half a century ago, as Hare has well said: "He recognized that there was an ever-increasing source of information as to the action of drugs in original researches, at that time carried out chiefly in the laboratories of central Europe. He appreciated that the day of a purely empirical use of drugs was on the wane, and that a new era was dawning in which the employment of drugs must be governed not alone by bedside experience but by experimental investigation which would, on the one hand, explain their effects and, on the other, make their application more thorough." Quoting his own words, this was his rule of action: "A primary knowledge of the end to be accomplished and a secondary acquaintance with the instruments are a necessity for human effort, and until the sway of this law is acknowledged by physicians, medicine can never rise from the position of an art to the dignity of an applied science. The work of the therapeutist is with the second portion of this law. Evidently, it is his special province to find out what are the means at his command, what the individual drugs in use do when put into the human system."

With this rule in mind, and with this law governing his work, he made his highest mark and became a pioneer in American pharmacology. He presented a substitute of abiding value for the old empiric methods, and taught with earnestness and honesty the rational use of drugs based upon a study of their physiologic actions. Thus it came about that his famous book, more than any single volume, laid the foundation of our present system of therapeutics.

Dr. Wood's reputation as a scientist, an ardent, enthusiastic and productive original investigator, rests upon a secure foundation: he inspired energetic endeavor with confidence; he impressed the memory and imagination of his students; he was a great medical teacher.

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*Medical Education in the United States. Lippincott's Magazine. December, 1875. xvi.

The Value of Vivisection. Scribner's Monthly. September, 1880. xx.

Automatism. Lippincott's Magazine. November and December, 1880. xxvi.

Memory. Scribner's Monthly. March, 1890. xxxix.

Conscious False Vision. Scribner's Monthly. December, 1897. lv.

The United States Pharmacopœia. Popular Science Monthly. January, 1905.

* This paper brought to a crisis the agitation which for many years had been going on in the American medical profession concerning medical education. It produced a revolution in the Medical Department of the University which finally forced other medical teaching institutions to reform their curricula. It strongly advocated State Board Examinations and had much to do with giving that legal supervision to entrance into the profession which now exists throughout the United States.

APPENDIX

PROCEEDINGS

OF THE

SECTION ON OPHTHALMOLOGY

JANUARY, 1920, TO DECEMBER, 1920

JANUARY 15

Unilateral Choked Disk

Dr. Frederick Krauss presented a case of unilateral choked disk in a ten-year-old boy. When first seen the right eye was blind with immobile pupil, except consenual reaction to light.

The disk was swollen about 6 diopters, with small hemorrhages, the other eye having a filled-in disk, rather too gray in tint. The swelling gradually disappeared, showing a membranous semi-transparent mass lying across the disk at an angle of about 105 degrees, and a considerable area of choroiditis to the outer and lower side of the disk for about 1 and 2 disk diameters respectively. The vision is now 15/70, with a much flattened field. The opposite eye has a concentrically contracted field. The Wassermann test was negative, but improvement followed large doses of iodide of potassium, so that a possible specific etiology was suspected.

Symmetrical Macular Degeneration in a Man and His Younger Sister

Dr. Burton Chance described the fundi of a man and his sister in which the macular regions were symmetrically affected. The lesions were discoid and rather sharply outlined from the surrounding retina by pigmented borders. In their characteristics the areas in the woman's eyes were singularly like those in the man's, except that they were but about one-half as large, his being somewhat larger than the nerve heads. In none of the eyes were there gross lesions elsewhere. The subjects were healthy Americans. Marked color vision defects were manifested by each. The fields in each exhibited contractions, but only in that for the man's right was there a scotoma. The corrected visual acuteness in each person's case was quite high. The man was slightly day-blind and had a convergent strabismus of low degree. The woman manifested an intermittent nystagmus.

Hole in the Disk Associated with Bridge Coloboma of the Choroid

Drs. T. B. Holloway and A. J. Bertram (by invitation) exhibited a patient, F. V., aged seventeen years, who first came to the Wills Eye Hospital October 8, 1919. The patient came to this country from Russia when six years of age. Prior to that time he vaguely remembers that his eyes were not perfect, but the first positive deficiency he recollects was when he reached quarantine in New York in 1908. His family history is negative.

Right eye: Cornea, iris and pupil negative. The disk is of somewhat irregular contour, the lower half showing a well-defined, broad groove, which slopes outward. Near the lower and outer margin of the disk in the grooved portion there is a characteristic hole, the outer border of which is somewhat pigmented, having a gray-green tint. A tiny vessel curves over the outer margin of the hole while two thread-like vessels can be noted coursing across the

bottom. The depth of the hole is 3 D. The vessels emerge eccentrically from the disk up and in at the junction of the upper third and lower two-thirds. The capillarity of the disk is fair, except in its lower half, which is rather pale. At an apparent distance of about 11 mm. below the margin of the conus or of the partial coloboma at the nerve entrance there is a large disk-sized area of choroidal disturbance; this is a sharply circumscribed lesion. At an apparent distance of 11 mm. below this lesion can be noted the apex of a typical coloboma extending as far forward as the eye can see.

Left eye: Widely divergent. Cornea clear; the iris shows a well-defined coloboma at seven o'clock. In the lens there is a well-defined, vertical rectangular opacity, 7 x 4½ mm. in size, in which can be noted possible calcareous changes. The lens has undergone partial absorption, and bridging across from the ciliary region to the lenticular opacity are several pigmented strands. Beyond the dense opacity above described less involved lens material can be noted on the temporal side and below. Between the lens remains and the ciliary region on the nasal side one can get a poor view of some of the fundus structures and can note a large area, extending downward and slightly inward, which gives rise to a reflex similar to that noted in cases of coloboma.

No operation was performed on the left eye and there is no definite history of trauma. The vision of the right eye is 6/9; of the left, L. P.

Concerning the hole in the disk, it was pointed out that this was situated in a groove in the portion of the disk usually affected. In referring to the etiology reference was made to the previous case report published by Holloway.

They referred to the classification of colobomata as cited by Coates, and felt that it was impossible to positively say whether a coloboma of the nerve existed in this patient, agreeing with von Hippel that ophthalmoscopic examination in these cases is not reliable in determining the pathological anatomy involved. They called attention to the unilateral coloboma of the iris, not the slightest evidences of a defect being present in the right eye.

Bilateral Colobomata of the Iris with Bilateral Coloboma of the Choroid, Including the Disk

Dr. T. B. Holloway exhibited and referred to the history of W. D., aged twelve years, who first came to his clinic at the Wills Eye Hospital, August 25, 1919. The child's mother stated the eyes were known to be defective since birth. The irides were of piebald type. There was a mixed nystagmus. The child preferred to fix with the left eye.

Right eye: There is a coloboma of the iris directed down and slightly in, 2.5 mm. in width. Several delicate opacities can be noted in the lens. A few delicate zonular fibers can be noted below, stretching between the notched border of the lens and the ciliary body, but they are deficient in numbers. Examination of the fundus reveals a large coloboma, the apex sweeping just above the disk, the position of which is best determined by the emerging vessels. The course of the vessels is very irregular here and there, showing marked dipping. There are vague splashes of delicate pigmentation over the colobomatous area. An unusually large number of vessels can be noted coursing over the colobomatous area well toward the periphery—doubtless so-called scleral vessels.

Left eye: In the iris, directed down and in, there is a coloboma measuring 2 mm. in width. The lens shows the same characteristics described for the right eye, except that no zonular fibers could be noted except at the extreme angles of the colobomatous area. As in the right eye a few vitreous opacities could be seen. The coloboma of the choroid is of the same character as that described for the right eye.

Dr. Holloway referred to the occasional rotary movements of the head that occurred when the child attempted to read. He called attention to the vague or uneven character of the surface and referred to the ectasia that could be noted in one eye. He stated that he had never seen a case in which so many vessels coursed over the affected area.

New Pupillometer

Dr. T. B. Holloway stated that until recently he had never found a satisfactory clinical instrument for measuring pupils. A year or more ago he had made a tentative design of what he thought might prove of service. Recently he chanced to see a cut of an ordinary optician's lens gauge which coincided to a marked degree with his previous ideas concerning a pupillometer. One of these instruments was obtained and has been used by him for several months. No modifications have been made except, as an experiment, the tips of the instrument were enameled, thinking that it might give rise to a greater contrast between the tips of the instrument and the underlying iris. He pointed out that the instrument was not only of service in accurately measuring the size of the normal pupil, which can be determined to a tenth of a millimeter, but that it was of the utmost value in determining the dimensions of oval or irregular pupils. It was likewise of the greatest service in making linear measurements on the globe or of lesions on the lids, also to determine the width of the palpebral fissure in cases of ptosis. He pointed out the splendid balance of the spring in the instrument, which was delicate enough for fine adjustment and yet stiff enough to permit rather free handling without changing the position of the indicator. He realized that a millimeter scale placed nearer the tip of the instrument would be of advantage, but the same degree of accuracy would not be obtained. Therefore he had been using the instrument exactly as it came from the shop, except for the enameled tips, and had found it the most satisfactory instrument for the purpose above described that he had ever used.

Fortunately it was an instrument that was used by practical shopmen, and, as a consequence, could be purchased for a price that was consistent with its actual value. In other words, it was free from the exorbitant price charged by most instrument makers.

History, Day-book and Ledger Cards

Dr. S. Lewis Ziegler brought up for discussion the subject of history, day-book and ledger cards. He thought that the practical side of one's daily routine deserved more careful consideration than was usually accorded it. He described the system that he had used for twenty-five years past and asked for suggestive criticisms and descriptions of other methods used by the Fellows. His history card measures 6 x 6¾ inches, and contains at the top a skeleton outline covering the routine items always recorded, viz., "No." "Date." "Name." "Residence." "Age." "Occupation." "Referred by." "Charge." "Duration." "Vision." "Accommodation." "Heterophoria." "Power of Muscles." "Glasses Worn." "History of Ophthalmoscopic Examination, Refraction, etc." A date column is ruled at the left side and the surgeon's name and address are printed in small type at the bottom. For lengthy histories supplementary cards are provided, having only a top line for name and a left marginal ruling for date. Fields, laboratory findings and other data are attached by clips to the history cards, separately or in manila envelopes. The cards are made by the Library Bureau of Boston.

He called attention to the need of keeping accounts for physicians in a manner that was convenient and met legal requirements. He had always used a combined day-book and ledger, which is a unit in itself. The pages are ruled with a wide space at the left side for the patient's name and address. This wide space is then subdivided into a three-line space running through each day of the month, comprising debits, remarks and credits, arranged thus:

DR.
RMKS.
CR.

The daily charge and the daily credit are then entered up and an abbreviated description or code word of the operation or treatment is inserted in the square interspace between the figures. At the end of each month the total debit and credit are carried

forward and a balance struck, from which bills can be sent out. Columns for these totals and balances are ruled at the extreme right of the page. It is optional whether these debits and credits shall be transferred to a small ledger card (3 x 5 inches), but it is very convenient to do so. It is also optional whether a compact bill-book shall be used or not, but this is also a most convenient form of making a rapid review of one's outstanding accounts.

This day-book and ledger has stood the "acid test" by being submitted to the Orphans' Court. The method was approved, the account confirmed and judgment awarded without argument or dispute. The book is made by Hoskins & Co., of Philadelphia.

He had always used a book of 400 pages, 14 names to the page, which was somewhat cumbersome to handle. He now proposed to use a loose-leaf system of 200 pages, 13 names to the page, which would be more convenient. The pages, however, must be numbered in pairs to indicate their continuity. Thus, page 15 for the first half of the month would be opposite page 15 for the last half of the month. The surgeon's name should be printed at the bottom of each page to convey its identity.

The legal requirements are that the original entry shall contain names entered in sequence and that each charge shall be entered in figures instead of by code or check mark. Card systems for individual names are not legal. It behooves the profession to put its bookkeeping on a legal basis and insist on payment, just as the grocer or merchant does. The laxness of one injures the prosperity of all. Patients who do not pay cash should not be allowed to escape payment of a just bill for services rendered.

FEBRUARY 19

Double Extraction of Dislocated Lens

Dr. Howard F. Hansell reported a case operated on as follows:

Double iridectomy, March, 1918: R. lens extracted in May, 1918; L. lens extracted in November, 1918.

The visual result on February 19, 1920, was:

R. + 9 ⊂ + 3 ax. 155° = 6/5.

L. + 10 ⊂ + 1 ax. 130° = 6/5.

The patient's father and mother were first cousins and the children of twin sisters. Her parents had eight children. After each child reached the age of thirty-five the sight became affected. One sister and herself with cataract, eldest sister blind for twenty years. Sight of all three brothers bad, cause unknown. A sister was operated on successfully for cataract in one eye. The surgeon refused to operate on the second eye. Parents' sight good.

Unilateral Blindness (War Traumatism) followed Later by Blindness of the Fellow Eye

Dr. Howard F. Hansell reported the case of a soldier, aged twenty-two years, who was struck at the junction of the frontal and temporal bones on the right side by a piece of shrapnel. The right eye received a slight injury of the corneoscleral border. Several days later, when the bandage was removed for the first time, he discovered the right eye was totally blind. The blindness has persisted until the present time. In December, 1919, he became suddenly, and without assignable cause, blind in the left eye. Examination disclosed two lines of choroidal rupture, parallel and straight, situated below the disk and the fovea in the right eye, and no lesion of any kind in the left eye. Thorough physical examination, including the sinuses, throat, teeth, radiographs of the head, urinalysis and the nervous system, was negative. The diagnosis lay between organic disease within the skull and hysteria. Without good reason for his faith, Dr. Hansell was inclined to believe the first should not be summarily dismissed, because we have no evidence to substantiate it. The corneal wound and double rupture of the choroid in the right eye are proof of severe concussion. If one could submit the brain tissue to inspection we might find anatomical changes, microscopic perhaps, in the visual pathways or centers that would be illuminative. In the

left eye light perception returned first in the periphery and later in the center. Pupillary response to light and convergence has been present throughout. The diagnosis of hysteria may be justified by the absence of physical signs, explanatory of the blindness in either eye, by exaggerated knee-jerks, by mental depression and by hope of compensation.

Dr. F. X. Dercum said he experienced some diffidence in addressing the Ophthalmological Section of the College. He realized that he was speaking in the presence of those who are especially qualified to express opinions on ophthalmological matters. However, it seemed to him there was only one explanation possible for the case which Dr. Hansell had so beautifully presented. In the first place, according to the ophthalmological findings, the injuries to the right eye were not of such nature as to account for the blindness in that eye. Secondly, the blindness in the left eye, which was normal to all examinations, came on very suddenly at a much later period and bore a close relation to the unfortunate experience which the patient had had with the Compensation Board. The light reflex, and in this Dr. Hansell was in accord, was well preserved in both eyes. This meant that the tracts, as far as the primary optic centers and inclusive of these centers, must be functioning normally. Further, if a lesion existed back of the primary optic centers in either hemisphere it would, in order to give rise to blindness, involve either the optic radiation or the cuneus. This would, of course, give rise to a homonymous lateral hemianopsia, a form of blindness which was clearly not present in Dr. Hansell's patient.

The case, in Dr. Dercum's judgment, was one of hysteria and must be classed with the shell-shock cases observed during the Great War. Like all cases of hysteria, the symptoms presented bear no relation to the facts of anatomy or indeed of physiology, and to him there was no other conclusion possible than that the blindness is psychic.

The fact that there was now an improvement in the vision, especially in the left eye, was in keeping with the improvements observed in functional cases. It would appear as though the sense

of injustice which the patient experienced from a reduction of his compensation aggravated the symptoms from which he suffered, *i. e.*, it led to an emphasis, a subconscious exaggeration, of his injuries and wrongs. Finding later that no change was taking place in the matter of his compensation, the symptoms were again growing less, very much as they do in litigants in the courts whose claims are non-suited or otherwise come to naught. Dr. Dercum was reminded also of the interesting experience among our troops in France as reported by Surgeon-General Ireland, who stated that of 2300 cases of shell-shock, with symptoms of deafness, blindness, palsies and other most diverse phenomena, 2000 recovered on the very day of the Armistice.

Dr. William M. Sweet said that he examined the eyes of the patient the morning following the loss of sight in the left eye, and at that time there was faint light perception in the upper inner field of the right eye, but no light perception in the left. The pupils were equal and responsive, and, except for the choroidal rupture in the right eye, the eye-grounds were normal. At an examination a few days ago the vision had returned to 20/70 in the left eye. Dr. Sweet considered the case to be one of psychical blindness, secondary to the shock and anger of the boy when his pension was reduced to a mere pittance, and believed that vision would ultimately return to normal in the left eye, with some sight in the right.

In discussing Dr. Hansell's paper, Dr. Risley said he was deeply interested in the report of Dr. Hansell's case. He had already reported eight examples in which blows upon the orbital ridge had produced serious impairment of vision, followed by secondary atrophy of the optic nerve and complete or partial blindness. They will be found in the published *Transactions of the American Ophthalmological Society*. His explanation at the time was that the force of the blow on the brow or the anterior segment of the skull was transmitted through the bony structures to the foramen lacerum and to the pathway of the nerve through its bony groove at the base of the skull, probably pinching the nerve. He believed that this was the explanation in the case under discussion, and was

inclined to explain the temporary blindness of the fellow eye by the less serious character of the injury transmitted to that optic nerve, so that repair was possible. He did not, therefore, think it was necessary to resort to the theory of "malingering" to explain the situation.

Vernal Conjunctivitis

Dr. Edward A. Shumway showed a case of vernal conjunctivitis of unusual severity, in which the growths on the palpebral conjunctiva had been successfully removed by five applications of radium over a period of six months. The dosage varied from 20 to 50 mg. and the exposure from 15 to 20 minutes in each upper lid. Vision was 5/5 in one eye and 5/30 in the other, the reduction being due to a corneal macula from ulceration, which had occurred before the radium treatments were instituted. In addition to the local reaction in the form of erythema of the skin, and temporary loss of the eyelashes following the radium applications, he had noted the formation of small localized abscesses of the conjunctiva of the lower lids, which required incision.

Dr. Posey said that he had recently had under his care a case very similar to Dr. Shumway's in which the radium treatment had been most successful, the hardened hyaline nodules gradually disappearing from the conjunctiva. In this case, however, the radium applications were followed by abscesses in both lids, which led to the loss of a number of the cilia.

Dr. Holloway stated that he has previously referred to two cases of vernal conjunctivitis, in which successful results had been obtained by the use of radium, and he was only too glad to verify Dr. Shumway's statements in regard to the efficiency of this method of treatment. He thought, however, attention should be called to the observations of Luedde in regard to the beneficial results obtained by the local use of fibrolysin. This observer has recorded a number of instances in which the local instillation of this drug has given rise to very rapid and in some instances apparently permanent results. In some cases he has felt it expedient to precede the local installation of fibrolysin by a drop of holocain.

Dr. Holloway stated that he had been keeping in reserve an ampoule of fibrolysin for a case of vernal catarrh, but none recently has come under his observation in his private work. For a time during the war this drug was off the market and he was unable to say whether it could be obtained at the present time.

Ocular Pemphigus

Dr. Wm. Campbell Posey reported a case of ocular pemphigus occurring in a young married mulatto woman. The skin affection had manifested itself by an eruption of small blisters on the chest before the eye symptoms appeared. These latter consisted in the involvement of the bulbar and tarsal conjunctival surfaces in a series of irregularly rounded grayish areas, which marked the site of previous bullæ. Both cornea were superficially infiltrated and vascular. The ciliary margins of both upper and lower lids were incurved and the lashes in apposition with the globe. A series of a dozen or more small bullæ were dotted here and there upon the lids and over the skin of the face. Treatment unavailing. Rapid shrinking of conjunctiva, with obliteration of cul-de-sacs, especially the lower. Vision lost by the involvement of the pupillary areas of the cornea by the progressive advance of the infiltrated areas. General condition of patient poor, asthenic and underweight. Wassermann negative. The patient had previously been under the care of Drs. Hirschler and Bernstein at different clinics for her skin affection, and Dr. Posey stated that each of these dermatologists had diagnosed the case as one of Duhring's disease, or dermatitis herpetiformis, a disease closely allied to pemphigus. As the difference between the two diseases seemed to be largely academic, Dr. Posey had decided to report the case under the broader and better-known disease. Dr. Posey referred to the rarity of ocular pemphigus, and among other statistics said that this was the first case among approximately 75,000 patients which had come under his personal care. According to the literature there seemed to be no constant relation between the duration of the skin affection and the duration of the ocular lesion. The affection

may begin as a general pemphigus and the conjunctiva not attacked for some years later. The disease may arise primarily in the conjunctiva and involve the skin later. Etiology obscure. Streptococcic infection suspected in some cases, in others a derangement of the nervous system, either by direct action or merely contributory to a successful parasitic invasion seems likely. Dr. Posey said that von Graefe was the first, in 1879, to suggest the now generally accepted identity of pemphigus and essential shrinking of the conjunctiva.

Prognosis for sight very bad. Fortunately death from general inanition frequently intervenes shortly after the mucous membrane of the eyes and mouth become involved. Local treatment mostly palliative. Generally, arsenic, quinin and strychnin are of most service.

Dr. Burton Chance stated that he has been interested in the subject of pemphigus for many years, since the time of his first case, which was diagnosed as one of "essential shrinkage of the conjunctiva," because of the absorption of the tissues and from consequent contraction, until there was an eruption of true pemphigus vesicles. In his opinion, from the account given, Dr. Posey's case is undoubtedly one of pemphigus. Without criticising the diagnoses made by the clinicians mentioned, it might be of interest to repeat what Dr. Duhring remarked when he was consulted about Dr. Chance's case many years ago. That eminent dermatologist stated that the differential diagnosis would always be most difficult because the two diseases are so very rare; it was his belief, however, that the ophthalmologist would be consulted more likely by cases of pemphigus than by those expressing phases of impetigo herpetiformis. While at the General Hospital of the Army at Cape May a soldier had been assigned to Dr. Chance, who had been affected while in France. There had been much uncertainty over the diagnosis, but Lieut. Whitam, from his most careful and painstaking study of the case, all of which was in consecutive detail in the clinical record, had concluded in the face of the opposition by competent dermatologists that the disease was pemphigus. After the man's arrival in this country ample opportunities arose

for Dr. Chance to confirm Lieut. Whitam's diagnosis, and the case was reported in detail by Capt. Connor and Capt. Burkholder prior to their sailing for France.

Dr. Shumway spoke of the great rarity of the cases of pemphigus, and said he had seen three well-marked cases, one of which he had demonstrated before the Section in 1909. In this patient there was widespread involvement of the skin, not only of the trunk and extremities, but also of the scalp, and the patient had died later from exhaustion at the Philadelphia Hospital. A second case had been treated at first for trachoma, and an operation done for entropion, but lesions were found later in the throat and the true nature of the condition was evident.

Dr. Shumway discussed the question of the identity of essential shrinking of the conjunctiva and pemphigus, and said originally they were held to be separate conditions, but that most authorities, especially eye surgeons, now considered them identical, though many dermatologists disputed this view. In trachoma the differential diagnosis was at times difficult, but the presence of pannus would point definitely to trachoma. Treatment was unavailing and operative interference apparently hastened the process.

Dr. Posey, in closing, said the first case of pemphigus he saw was at Moorfields, in a middle-aged man, in whom the inflammation had run a much more chronic course than in the case just reported by him. Here the malignancy of the inflammation was intense, the two opposing surfaces of the conjunctiva becoming glued together despite all his efforts in but two or three months. There evidently are two distinct types of the disease.

Uniformity in the Essentials of Perimetry

Dr. Luther C. Peter said there should be uniformity in the essentials of perimetry in order to have uniform results. If the premise is incorrect the conclusions are also likely to be faulty. Three essentials have been very much neglected in the practice of perimetry in the past: (1) that of illumination, (2) definiteness

in the colors employed as a stimulus, and (3) accuracy in the size of the test objects used, expressed in degrees rather than in linear measure.

1. Because of the uncertainty of daylight illumination in offices, artificial illumination supplied by a standard filter is the logical source of illumination for perimetric work. This can be made uniform throughout the world, or approximately so, by adopting a specific filter of known efficiency and definite candle-power to the square foot of surface to be illuminated at a definite distance from the screen. The adoption of such a form of illumination will not solve all our problems, but will bring about a uniformity of illumination which for all practical purposes may be regarded as standardized.

2. As to the colors employed in the test object stimulus: These colors should be expressed in definite wave lengths. The exact hue or tone of the colors should be determined by a commission appointed by our ophthalmologic bodies, and should be accepted as the standard throughout the world. Although uniform purity of pigments cannot be obtained, frequent subjection of the pigment papers employed to the spectroscope will maintain fairly accurate standards. Each tone, however, should be expressed in a definite wave length.

3. As all perimetric studies are made on the arc of a circle or its tangent, the designation of the size of a test object should be made in degrees, minutes and seconds. Regardless of the length of the radius of the instrument, therefore, a test object so expressed would have definite significance to all. No reason but habit has up to this time been given as to why the test object should be expressed in linear measure instead of the angle expressed in degrees, minutes and seconds subtended by the test object.

Dr. Geo. S. Crampton said that perimetry as practised at the present time, while much more accurate than it was a decade ago, is still subject to a considerable number of errors even in the hands of those who have taken pains to improve their technic in every possible way, and any attempt to standardize the nomenclature and practice of the art must meet with our approval.

The question of properly illuminating the test object is of considerable importance, especially now that there is an increasing tendency to use objects which subtend very small visual angles, as it has been shown that very small test objects are more sensitive to variable illumination than the larger sizes.

While we have found ordinary daylight too variable for our test cards, most of us have continued to use it for perimetry, largely because of the difficulties involved in properly lighting our instruments or tangent screens. This subject is being studied at the present time by a committee of the American Ophthalmological Society, and it is probable that suggestions for a standard method will be announced shortly.

The recently invented daylight screens will, no doubt, be of great service in illuminating our test objects in their true colors, but they are very wasteful of energy and may not prove practical for this reason in the illumination of large tangent screens unless some means be devised for local illumination upon the surface of the test object carried in the hand. While transillumination of the test object has not proved entirely successful up to the present time this method may yet prove of value when more fully studied. Unfortunately it is difficult, or I might say impossible, to obtain spectrally pure translucent screens, and even our best pigment papers are apt to surprise one who views them through a spectroscope for the first time.

Fortunately, Clifford Walker and others have demonstrated that we can, as a rule, get along very nicely without using colors at all, as color defects are almost always represented by form defects when the visual angle is made small enough.

The factors of preëxposure and the surrounding field should be considered in relation to their effect upon the outlines of the visual field. It is a question yet to be decided whether these two factors, which Drs. Ferree and Rand have demonstrated to have a marked bearing on the limits of their fields as taken in the laboratory, will have an appreciable influence upon the art as practised by the ophthalmologist. Certainly nothing should be omitted which will give us better results in our every-day work.

In reference to the dimensions of the test object, it is gratifying to note a growing tendency to speak of the visual angle subtended rather than to refer to an object of a certain size, as in the latter case the screen distance must also be mentioned or the size has no meaning. In any case round disks only should be used, as the angle can be readily found if the diameter of a round disk is stated, together with the distance at which it is used.

Clifford Walker's careful work in giving us graphic charts whereby the visual angle for test objects of varying sizes and distances can be told at a glance should not be overlooked.

He has considered most of the errors that may affect our perimetric results, and has shown how they may be eliminated to a considerable extent at least. If the graphic chart is not at hand the visual angles can be readily computed by multiplying the disk diameter in millimeters by the constant 3437.7 and dividing the result by the distance in millimeters. This will give the visual angle in minutes.

Walker states that in using a visual angle below 7.5 minutes (0.6 mm.) at the usual perimeter distance the size of the disk supporter becomes disproportionately large and may mislead the patient. Below a five-minute angle it is better to change to a campimeter or a perimeter of greater radius.

It was found that a disk of about 1 mm. diameter had the widest range of usefulness, and that it was most convenient to use the 1.2 mm. disk and distances of 1000 — 1500 — 2000 and 2700 mm.

Dr. C. E. Ferree and Dr. G. Rand, of Bryn Mawr College, said that the difficulty of getting reproducible results in determinations of the color sensitivity of the peripheral retina is a common complaint among laboratory and clinic workers. The actual distribution of retinal sensitivities is only one of the factors influencing the results of a perimetric or campimetric determination. By varying the conditions under which the work is done the zones of color sensitivity may be made to have almost any extent within the limits of the field of vision, and to vary radically in shape.

The variable factors which influence the apparent limits of color sensitivity are, so far as we have been able to determine,

the wave-length and purity of the stimulus, intensity of stimulus and the visual angle, length of exposure of the eye, accuracy and steadiness of fixation, the general illumination and state of adaptation of the retina, breadth of pupil and the brightness of the preexposure and of the background or surrounding field. Only a few of these can be considered here. (1) The most important factor is intensity of stimulus. With very high intensities the limits of red, blue and yellow are coincident with the limits of white-light vision. Green cannot be made to have so wide an extent. With stimuli of medium intensities of equal energies the limits of red, blue and yellow interlace or criss-cross. Again, the limits for green are narrower. The conventional clinic rating from widest to narrowest of blue, red and green is, with the exception of green, a function of the intensity of the stimuli employed. A decrease of intensity of the stimulus not only narrows the limits, but, because of the irregular distribution of sensitivities in the different meridians, causes a marked change in the shape of the zones of sensitivity. (2) Breadth of pupil is effective through influencing the clearness of imaging, the amount of light entering the eye and the degree of excentricity at which an image may be formed on the retina. (3) The brightness of the surface to which the eye is preëxposed may change the limits in certain meridians as much as 20 degrees. A preëxposure lighter than the color gives a dark and one darker than the color a light after image. These achromatic or brightness after images change profoundly the saturation of the color sensation, also its hue. (4) A background or surrounding field lighter or darker than the color produces a similar but not so great an effect on the limits. In this case the disturbing achromatic effect is produced by physiological induction or contrast. The variable effects of brightness of preëxposure and surrounding field can be eliminated only by making both of the same brightness as the stimulus color. (5) When pigment stimuli are used the intensity of illumination of the perimeter arm conditions the intensity of the stimulus light. Also, unless this illumination is kept constant and is uniform for all points on the perimeter arm the variable effect of preëxposure and surrounding field cannot be eliminated.

That is the shade of gray which is needed to match the color in brightness, changes with change of illumination.

All of the above-mentioned factors can be standardized and controlled. When this is done the limits can be reproduced within a very remarkably small limit of error. We have devised and are having constructed a perimeter by means of which equal illumination of the stimulus is secured at every point on the arc, and the variable effects of brightness of preëxposure and surrounding field can be eliminated with an ease and speed of manipulation which, we believe, is feasible for office and clinic work.

Case of Discission of Lens in High Myopia

Dr. J. H. Dewey said the opportunity it affords of observing the characteristic changes found in high myopia in an eye rendered practically emmetropic by operation was his reason for presenting the case rather than the results of the operation or as an advocate of this procedure.

He rather tried to dissuade the patient from the operation, and the dangers were explained, but all that interested him was getting away from the thick lenses, and he was perfectly willing to assume all the risks.

Before operating the vision in O. D. with S. -18 = 5/20. O. S. S. -20 = 5/20.

The knife needle was entered through the sclera in all the discissions. Only after one was there any reaction. This one was followed by some pain, with slight ciliary injection the next day, but entirely subsided in twenty-four hours.

Seven operations were done on the left eye and five on the right one. The first operation on the left one was performed on June 18, 1917, and the last one September 7, 1918. The first one on the right eye January 25, 1919, and the last one December 15, 1919.

The vision now in O. D. with S. $+0.50$ $\supset$ cyl. $+1.00$ ax. 180 degrees = 5/9. O. S. S $+0.50$ $\overline{\supset}$ cyl. $+1.00$ ax. 180 degrees

= 5/7 full and several letters of 5/5. The improvement in vision is rather better than stated in the numerous tables published showing the results which should be obtained after removal of the lens in high myopia, and the correcting lens corresponds closely to the one that should be expected, according to Hirschberg's table for the reduced eye.

That the operation has no influence on the increasing myopia is unfortunately already demonstrated in this case, in which the myopia has increased in the left eye one diopter in a little over a year.

As to the danger of increasing the tendency to detachment of the retina there can be no question, but statistics vary greatly on this point.

In discussing cases adapted to the operation, Dr. Dewey found only those of high myopia advocated. It occurred to him that the operation might have its most legitimate field in a class of cases in which the myopia runs from 7 D. to 15 D., and the vision with correction is between 5/20 and 5/50, the patient still able to read fine type.

To have this vision doubled would be of great advantage, and it would seem reasonable to suppose that the danger of subsequent retinal detachment would be less than in the higher myopes.

Cocain Poisoning

Dr. Harold G. Goldberg reported the case of a patient who had been operated on a short time before under cocain anesthesia without any ill effects, but upon the occasion reported, more than the usual number of drops had been used, which he believed had passed through the tear duct and an excessive amount of the drug absorbed. The patient showed typical signs of cocain poisoning, but recovered without injury to the eye or general health.

In discussing Dr. Goldberg's paper, Dr. Risley said he had seen no striking example of serious cocain poisoning, but had not infrequently witnessed what appeared to be hallucinations which he

ascribed to the constitutional effect of the cocain after repeated instillations of 4 per cent. solutions during more or less prolonged operations. He had, however, soon acquired a sense of anxiety lest the profound local effect witnessed after the instillation of 4 per cent. solutions of the earlier preparations of cocain should disturb the prompt healing of the wound. In the earlier preparations which came into our hands he thought there was a degree of sudden blanching of the tissues, with conjunctival edema and infiltration of the epithelium of the cornea, disturbing its transparency, to an extent he had not witnessed in the 2 per cent. solutions which he is habitually using during later years. Indeed, the difference was so striking that he was led to inquire whether there might not be some change in the mode of the manufacture of the drug as now present in the market.

Dr. Peter said: Apropos of the case which Dr. Goldberg has reported, he wished to cite an instance of cocain collapse which occurred several years ago from the use of tabloids of homatropin and cocain. The patient was a man of about thirty-five. Two tabloids were introduced into the cul-de-sacs, each tabloid containing one-fiftieth of a grain of homatropin and one-fiftieth of a grain of cocain. As was his usual custom the patient was instructed to compress the puncta for about five minutes. He evidently failed to follow instructions, and in about five minutes suddenly collapsed in the office and dropped to the floor pulseless and the respiration ceased. The recovery was rather prompt after the patient fell into a recumbent position. He had no reason to suspect that this was of psychic origin, inasmuch as the patient had had drops instilled into his eyes on former occasions. It was a typical cocain collapse. The maximum amount of cocain that the patient could have received from these tabloids was one-twenty-fifth of a grain.

Contusion of Eye with Oil Droplet Staining of Conjunctiva

Dr. H. Maxwell Langdon related the case of J. K., male, aged forty-one years, who was first seen January 19, 1920, with a his-

tory that two hours before he had been struck in O. S. with a jet of heavy gas oil coming from a tank under the pressure of between 50 and 60 pounds to the inch. O. D. was perfectly quiet. In O. S. the lids were slightly swollen, the conjunctiva greatly chemosed and discolored in two irregular patches running horizontally, one above and one below the cornea, each having its border nearest the cornea about 3 mm. from the limbus. There was a slight abrasion of the cornea in its lower portion, otherwise the eyeball externally and internally was negative. O. D. V = 6/VI. O. S. v = 6/X. Under the loupe the masses of discoloration were found to consist of many minute droplets of oil, which had been forced into the conjunctiva by the great pressure. The course of the condition was as follows:

There was a great increase in the chemosis of the conjunctiva and much swelling of the orbital tissues, so that the eyeball was not only moderately proptosed, but there was a distinct loss of motility. In four days under constant ice compresses the swelling had subsided and motion was much better. Within ten days after the accident conditions were normal except for some residual staining of the conjunctiva, which has since, under dionin and hot compresses, entirely disappeared. With a —0.50 spherical V = 6/V.

The interesting feature in this case is the fact that in spite of the great pressure, sufficient to drive the oil into the conjunctiva, the eyeball itself suffered no injury except the very slight abrasion of the cornea.

Dr. Holloway stated that in Dr. Langdon's interesting case the manifestations were most unusual, and it was the first time he had an opportunity to observe a case of this character. Not infrequently patients come to a clinic stating that they have been impressed by fluids under high pressure, but almost invariably one finds that the statement is incorrect or not wholly true. He then cited an instance in which the patient's first statement was that he was struck by a stream of water under high pressure, but subsequent events proved that he had really been struck by a brass valve driven out by the force of the pressure.

Deep Peripheral Keratitis

Mrs. M. A. was seen at Dr. W. T. Shoemaker's service at the Pennsylvania Hospital on February 9, 1920, with the following history:

Four days previous to this a dimness of vision of the right eye had been noted. (The patient had visited the dispensary for refraction in September, 1919, when O. D. v = 6/VI). There had been no pain or tenderness of O. D., and the left eye seemed in every way unaffected.

Examination of O. D. showed a very slight enlargement of one or two of the lower conjunctival vessels; no ciliary injection whatever. In the cornea there was a triangular patch of infiltrate, the base being at the lower limbus and the apex in the center of the cornea, the base being 8 mm. across. It was gray except for a band running parallel with the limbus, about 2 mm. broad, which was decidedly reddish in tint, suggesting a "salmon patch." The corneal epithelium was unbroken. The pupils were equal and responded promptly to light and other stimuli. There was no discoloration of the iris of O. D. Ophthalmoscopically the media were clear and the fundus unaltered. Under the loupe the infiltrate was seen to consist of many vertical parallel lines irregular in outline but very regular in their vertical course. The "salmon patch" was seen to be made up of many fine capillaries growing into the corneal parenchyma from the limbus. Physical examination showed no organic changes in any of the viscera. The complexion of the patient suggested a moderate anemia, and the blood examination showed a hemoglobin of 75 per cent.; red blood cells, 3,140,000; white blood cells, 9000. The Wassermann was weakly positive. The patient has been placed on Blaud's pills, mixed treatment and locally atropin and dionin. The sclera in the lower portion has become a little more congested, and there has been decided increase of vascularity in the "salmon patch," so that the tint is nearer carmine than "salmon."

In attempting to identify the type of keratitis, which was

obviously interstitial in character, it was narrowed down to one of three possibilities: The so-called deep marginal keratitis described by Fuchs; sclerosing keratitis, and a type of interstitial keratitis mentioned by Roemer but given no definite name. It has seemed that the keratitis marginalis profunda might be excluded on account of the age of the patient, as it usually occurs in elderly people, the involvement of so much of the cornea, the fact that it usually occupies the upper portion of the cornea and because of the lack of inflammatory reaction. Sclerosing keratitis is preceded by a patch of scleritis, being a complication of that condition, and the patches are irregular in shape. It seems, therefore, that we should deal with that form of interstitial keratitis mentioned briefly by Roemer, who simply says, "The entire opacity is found on the lowermost part of the cornea, where it assumes a triangular form, with the apex directed upward."

In view of the negative physical findings, except for the moderate anemia and the weakly positive Wassermann, it seems most likely that this case is specific in origin. As to whether it is hereditary or acquired it is impossible to say; no other signs of hereditary syphilis are present; the patient is one of four children, all living and well, with no miscarriages in that generation. She has had two pregnancies and two children, both living and well.

Dr. Posey said that he remembered presenting to the Section two cases of triangular opacity of the cornea in syphilitic subjects several years ago. The opacity in each instance had appeared some time after the inflammation had first inaugurated itself. He thought it a matter of clinical experience that in cases of commencing keratitis parenchymatosa the cornea frequently becomes infiltrated in localized areas, and that sometimes a triangular opacity appears at the margin of the cornea and retains that form for a time before extending over the entire membrane. This peculiarity in form is due to a syphilitic affection of the marginal loop of bloodvessels, and it is not unlikely that the persistence of the triangle in the two cases presented was dependent also upon vascular causes.

In discussing Dr. Langdon's case, Dr. Risley said the condition

of the cornea recalled the group of cases he had already published in which these conditions had rapidly recovered under the administration of the pulverized thyroid gland of the sheep. In a word, the general appearance of the patient and the corneal condition suggested to him a case of hypothyroidism.

Extraction of a Morganian Cataract

Dr. G. Oram Ring presented a brief report of an interesting accident in connection with the extraction of a Morganian cataract.

The patient, a male, aged sixty-three years, weighing 180 pounds, of ruddy complexion and good, general health, had been blind in both eyes from cataract for nine years.

The lenses were homogeneously gray, with a conspicuous series of dense white dots of capsular proliferation. The nucleus was invisible. Perception and projection were good. Dilatation under mydriatic was moderate.

Operative treatment had been declined previous to December, 1919, and no remedy other than the soporific toxin of Christian Science had been utilized.

A preliminary iridectomy was performed early in December last, the healing of which was entirely uneventful.

One month later, under cocain, the usual flap, including the upper third of the cornea and a small amount of conjunctiva, was made.

Following the application of the cystatome to the capsule because of the patient's nervousness, the lids were closed and the operation suspended for a moment.

Upon opening the lids the entire pupillary area was perfectly black (the liquid cortex having completely extruded itself), except that the dense, hard nucleus had fallen down to the base and temporal side of the capsule, back of the outer pillar of the iris. It becoming evident at once that corneal pressure would not complete the extraction, the 5 mm. nucleus was delivered by a small loupe without accident.

A slight but temporary cystoid cicatrix was the only complication of the healing. Corrected vision was 20/30.

Dr. Ring thought it possible that had the interval for rest not been utilized the nucleus might have been extruded with the onrush of the milky cortex.

Reference was made to the return of sight in Morganian cataract by liquefaction and absorption or by the bursting of the capsule and the absorption of the semiliquid matter, which discharged itself into the anterior chamber.

Dr. Chance stated that he was very much interested in Dr. Ring's account of his case of Morganian cataract. He himself had had two quite interesting cases of hypermature cataract which he reported several years ago. He cannot help but be grateful that Dr. Ring had succeeded in snatching a case from the clutches of the Faith Curists, for the history of pilgrims to faith cures discloses that many instances of recovery from blindness in those known to have had cataracts were truly cases of hypermature cataracts which had undergone dissolution. He was especially interested in Dr. Ring's patient, in so far that that gentleman had been his own first music teacher, and he cannot help but deplore the misfortune that so charming and useful a person had been consigned to darkness for so many years, when it would have been entirely possible for him to have recovered his sight and continued his musical practice.

MARCH 18

Concerning Treatment of Congenital Cataract

Dr. P. N. K. Schwenk applied his remarks to lamellar cataract, it being the most common form in children and in all cases where the pupillary area is covered. He favors early operative interference in order to maintain the retinal function, and cited cases where delayed operations caused amblyopia due to failure of early

retinal stimulation. The operation is that of curettement of the lens, removing as much of cortical as possible through a small opening into the upper part of the cornea by means of a broad needle. Under general anesthesia and a widely dilated pupil he enters his broad needle in the upper part of the cornea just in front of the iris, so as not to have the iris engage in the opening, passes needle deep into the lens, making two lateral movements with needle, so as to make a large opening into the lens, withdraws needle with gentle backward pressure to invite cortical to engage into the wound over needle, then with iris forceps grasps the anterior lip or flap of capsule and withdraws it. If the capsule is shriveled, or too tough to rupture with the needle, he grasps the capsule with iris forceps and by gentle traction removes capsule with lens contents, dresses the eye, applies bandage, which is retained for three days, when the eye can be left unbandaged.

Dr. Schwenk stated that discission was nothing more than an intended traumatic cataract and the treatment of traumatic cataract is curettement of lens and therefore it is logically the safest treatment for congenital cataracts. The radical operation is not attended by any greater risk—not as much—than that of discission. Later on repeated operations are rendered unnecessary and add much to the pleasure and physical development of the patient. Dr. Schwenk cited that he operated on his first case at eleven months, removing a shriveled lens capsule in its entirety, and three months later repeated the operation on the other eye.

Burton Chance stated that it had been his privilege to assist Dr. Schwenk in a number of his early cases, and besides witnessing the operations in others, he has examined several of the earlier cases in recent months. Except in the instances cited by Dr. Schwenk, there had been uniform freedom from entanglements of iris and capsule in the cicatrices. In spite of the points so pertinently brought out in the discussion, he believes that from the results obtained Dr. Schwenk has been justified in his procedure.

In Dr. Chance's opinion, in considering cataract in the young, when so dense as to render the child blind, the surgeon should operate early before the child's mental and physical natures are set,

for even though light perception only is gained the child's development will be benefited by the removal of the opaque lens.

Dr. Posey said that he could not agree as to the desirability of operating as early as possible in congenital cataract, for in his judgment the age at which the operation should be undertaken depends largely upon the extent of the opacification of the lens and the degree of vision, for while he considers it desirable to remove the opacity as early as possible in eyes that are blind or in which the vision is very much reduced, on account of the danger of the mental development of the child being retarded from lack of sight, he makes it an invariable rule not to operate until the child is ten months old, for at an earlier age the structures comprising the anterior segment of the eye are so small and so little developed that it is scarcely practicable to perform the necessary instrumentation. Moreover, it has been asserted that the amount of aqueous humor in a younger child is insufficient to procure the solution of the liberated lens substance. Dr. Posey, however, insists that operation should not be deferred later than ten months in such cases, for, while it is true that the mentality of many infants with congenital cataracts is permanently deficient and the lenticular opacities coexist with other stigmata of degeneration, he has seen improvement of vision stimulate the mentality in too many cases not to consider its betterment in all instances at as early an age as possible.

In all cases, however, in which the opacification is not complete and vision is fairly good, it is well to postpone operating until even three or four years have been attained, for the longer the surgeon waits the more the eye develops and the more apparent does the exact nature of the lenticular opacity become, and the dressing and bandaging of the eye are easier and there is less danger of infection.

He does not believe the functions of the retina are at all interfered with by delaying the operation. He thought Dr. Schwenk's procedure more dangerous than simple discission, on account of the liability of entanglement of the iris.

Dr. Zentmayer said: While he believed in early operating in

congenital cataract he did not think we need be deterred from waiting until the child has grown for fear of loss of function of the retina, as there is no analogy here to amblyopia exanopsia. Cases are on record where excellent vision was secured after the absorption of congenital cataracts as late in life as the twenty-fifth year. He believed the needling operation for congenital cataract, where there is no evidence of undue thickening of the capsule, by far the safest operation. A single needling is often sufficient if the surgeon and patient are willing to wait and let Nature act. Usually, however, more than one operation is required. When the needle is entered through the sclera the danger of infection is negligible. It is difficult to avoid an anterior synechia in the linear method. Recently there was exhibited before a local society three children who had been operated upon by a modified linear extraction and in two there was anterior synechia. In a case recently operated upon the diagnosis of thickened capsule was confirmed at the operation, for on attempting to withdraw the knife-needle the lens was brought into the anterior chamber, where it was successfully removed by the Ewing method. This consists in passing a broad keratome behind the lens so that the pupillary area is shut off, and in delivering the lens along the blade of the keratome.

In discussing Dr. Schwenk's paper, Dr. Risley said that he knew of no other group of cases requiring surgical interference in ophthalmology that required more individual judgment and ingenuity in their management than congenital cataract. In the first place they occurred quite habitually in children who are otherwise abnormal; the lens disease being only one manifestation of the disorders of the tissues developed from the ectoderm and mesoderm throughout the body. There were usually intestinal disorders leading to a general toxemia, glandular enlargements, and choroidal disease which was the immediate cause of the lens opacity.

He thought it was better to treat these general disorders, and to avoid all operative interference upon the eyes until the child was five to ten years of age. He had often found a preliminary iridectomy a wise procedure, after which the general health of the eye seemed to improve. He was often controlled by the peculiarities

of the individual case as to what subsequent operative procedure should be undertaken. He thought in the majority of cases that discission operations were desirable, and where the capsule appeared tough, and proved to be resisting to a single knife needle, he had a second one at hand and inserted it from the opposite side of the cornea to that first pierced and made the one knife a point of resistance for the other, their points being separated in the lens, the two moving in opposite directions. By this method he had often succeeded in tearing or cutting the capsule and incising the opaque portions of the lens and in securing an open pupil, where he had failed with but one Hays knife.

Dr. G. Oram Ring referred to a method he had learned from Dr. Risley and had used with great satisfaction, namely, with pupil dilated *ad maximum*, the Hays-Ziegler knife was used to incise capsule and lens, in a vertical direction, the incision beginning just below the upper dilated pupillary border and extending downward to a position just above the lower border.

While the incision was carried deeply into the lens, it did not penetrate the posterior capsule, as did Dr. Ziegler in his V-shaped method.

Dr. S. Lewis Ziegler thought personal opinions could reasonably differ according to each one's experience. He would operate on congenital cataract at any age, early or late, depending on the indications. He did not think that delay would destroy visual function, but it might cause mental habetude or loss of muscular coördination. He had seen congenital cases operated on at thirty, forty and sixty years of age retain full visual acuity. There might be loss of proportion or the sense of distance, but this could occur at any age and was soon overcome by training.

Curettement of the lens, paracentesis and linear extraction were practically identical procedures. The possible complications of this procedure are iris prolapse, entangled capsule, rapid swelling of cortex, wound infection, corneal astigmatism and anterior synechiæ.

For some years he had been practising through-and-through division of the lens by his V-shaped incision. The pressure of

swollen cortical was fore and aft and the ciliary body did not become inflamed by swelling in the angle. The cortex dissolved rapidly and only a single operation was required. He had recently operated on a child, aged three years, and another of eight, both of whom he would try to show at the next meeting.

The late Dr. Strawbridge often resorted to paracentesis. He did this operation on the father of the three-year-old child previously referred to, but a prolapse of the iris necessitated iridectomy, and posterior synechiæ followed. By the older methods of discission it is often necessary to resort to paracentesis because of rapid swelling of the cortex. We should therefore welcome any new technic that will help us to escape this complication.

Dr. Holloway stated that he thought the treatment of these cases depended upon the type and character of the cataract encountered. While it may be advisable to defer very early operation in the zonular cases, he believed that total congenital cataract should be subjected to earlier operative procedures. He has just dismissed from the hospital a case of this character in a twenty-two-months' old infant. Each cataract in this case was hypermature. A successful result was obtained: Another infant, aged fourteen months, was now in the hospital and one eye had been successfully operated on. In regard to Dr. Risley's statement concerning iridectomy, he stated that in certain cases with small zonular opacities Critchett did an optical iridectomy as had been practised by his father. He believed that in certain of these zonular cases, especially with moderate degrees of vision, the lens should not be touched.

Exhibition of a Case of Facial Palsy, with Paralytic and Cicatricial Ectropion of Lower Lid

Dr. Posey exhibited a young man who had developed the above condition as a result of disease of the superior maxillary bone in early childhood. The cosmetic deformity was considerable, but the chief cause of complaint was excessive lacrimation from the

malposition of the lower lid. To correct this a thorough division of a series of cicatricial bands, which bound down the margin of the lid to the lower orbital rim, was done subcutaneously. Three sutures were then passed through the ciliary border of the lid and the lid pulled as far upward as possible over the upper lid and secured in this elevated position by anchoring the sutures in the tissues just below the brow. To raise the inner canthus and to restore the functions of the lacrimal apparatus by bringing the punctum into apposition with the globe a flap was cut from the root of the nose, after the method of Hassner, and sewed into the tissues just subjacent to the lower lid margin, being superimposed upon an area which had been previously denuded of skin for its reception, the flap being so shaped and devised that it exerted an upward and inward traction upon the lid in the cicatrizing process. The sutures which dragged the lower lid upward were removed at the end of ten days. Cosmetically the results of this double procedure were very fair. Lacrimation, however, persisted, and the palpebral portion of the lacrimal gland was removed, without, however, exercising any marked improvement on the tearing. The removal of the entire gland was therefore decided upon and was accomplished without accident.

Presentation of Original Hays Knife-needle

Dr. Wm. Campbell Posey presented to the college a Hays knife-needle which had been the property of its designer, the late Dr. Isaac Hays, and used by him years ago. The instrument had passed into the possession of his son, Dr. I. Minis Hays, who had given it to Dr. Posey. A description of the instrument as published by Dr. Hays in 1855 is as follows:

"This instrument from the point to the head, near the handle, is six-tenths of an inch; its cutting edge is nearly four-tenths of an inch. The back is straight to near the point, where it is truncated so as to make the point stronger, but at the same time leaving it very acute, and the edge of this truncated portion of the back is

made to cut. The remainder of the back is simply rounded off. The cutting edge is perfectly straight and is made to cut up to the part where the instrument becomes round. This portion requires to be carefully constructed, so that as the instrument enters the eye it shall fill up the incision and thus prevent the escape of the aqueous humor."

Dr. Posey referred to a paper by S. Lewis Ziegler, on the "History of Iridotomy," which contained a description of all the instruments which have been devised at various times for incision of the iris, and said that the knife-needle designed by Ziegler is a modification of the pattern devised by Hays. Dr. Posey said that he preferred the Hays knife, or Ziegler's modification of it, to another form of knife-needle.

Dr. Hays, who was born in Philadelphia in 1796 and died in the same city in 1879, was one of the foremost as well as one of the earliest ophthalmologists of America. He graduated in medicine at the University of Pennsylvania in 1820 and soon after devoted himself to ophthalmic practice. In 1822 he was appointed a surgeon to the Pennsylvania Infirmary for Diseases of the Eye and Ear, and a similar distinction was conferred upon him on the organization of the Wills Eye Hospital in 1834. He served the latter institution for twenty years. In addition to being the designer of the Hays knife, Dr. Hays successfully edited three American editions of Lawrence's *Ophthalmic Surgery,* in the last of which, published in 1854, Dr. Hays recorded the first case of astigmatism reported in America. In addition to his ophthalmological pursuits, Dr. Hays was much interested in natural history, but he is perhaps best known to posterity by his long tenure in the editorship of the *American Journal of the Medical Sciences.* He was for many years a Fellow of this College and greatly interested in its welfare.

Dr. Burton Chance wished to express his thanks to Dr. Posey for the donation of the Hays knife, and he trusted that it will be preserved in the about-to-be-formed "historical museum" of the Section. Ever since his undergraduate days Dr. Chance has been interested in the Hays knife, for it was one of the instruments

recommended by Dr. Ashhurst, and was figured in his text-book of *Surgery*, in the chapter on Diseases of the Eye, which students had to study in their preparation for graduation, as at that time ophthalmology was subject to general surgery in the curriculum of the University.

He called the attention of the Fellows to the fact that Hays devised his knife for the treatment of mature senile cataract. At the period of its invention, 1850, the procedures for the extraction of the entire lens were regarded as dangerous and were to be resorted to only under the greatest necessity. The knife would be used, therefore, repeatedly for the solution of the solid lens. Many and various were the needles used for the purpose, besides those suitable for reclination, but none were so simple as that devised by Hays. Having seen the instrument used, with such beneficial effects, for other purposes in the hands of so many of his teachers and friends, he said that he was astonished to find, in 1911, that it had only recently been introduced, in the form of the so-called Ziegler modification, in a certain hospital in England, the ophthalmic wards of which were then in charge of distinguished ophthalmologists. He could then understand why capsular after-cataracts were so rarely discinded by his English confrères, whose armamentarium contained, however, ground-down von Graefe's cataract knives. With the image of this simple knife-needle before him he wondered how it was found possible to manipulate a blade which was in effect a lengthy triangular lance.

The specimen shown tonight, Chance noticed, had been made in France. Now, Hays lamented that his first knives were unsatisfactory. Those entrusted to a famous London instrument maker were impossible, and those developed by a French cutler were but little better. But Kolbé, of Philadelphia, formerly an employé of Luer, was able to fashion one so exactly as to receive Hays' praise. This may not be uninteresting to those who are mindful of Philadelphia's position in the medical world.

It is perhaps not out of place here to speak of the knife which Dr. Ziegler modestly claims to be a modification of the Hays knife. A comparison between the specimen exhibited tonight and Dr.

Ziegler's latest pattern will show that they are not at all similar, and in Chance's opinion the Ziegler knife-needle is a distinctly separate device.

Temporary Obstruction of the Central Artery of the Retina

Dr. Geo. H. Cross reported the case of E. P., aged forty-eight years, white (English), patternmaker. Past medical history, rheumatic fever twenty-five years ago. Present illness, last July was ill during the night with a severe headache, on the next day he could not talk well; he worked at his trade for a while, when his right hand became weak and he had to give up work. He lost the power of movement in the right side of the face and arm, with motor difficulty in speech; complained of failing vision in left eye. Laboratory examination: Wassermann, negative; urine, negative; blood-pressure: systolic, 138; diastolic, 98.

Examination December 10, 1919: Left eye—vision could not be recorded, due to mental condition; pupil reacts promptly to light and convergence; media clear; disk round; margins fairly sharp; central physiologic depression; lamina well seen; margins of physiologic depression encircled by small artery on the rim; disk congested, bloodvessels full, swollen and tortuous. At the moment of observation there was a sudden break in the descending temporal artery, this break resembling in appearance the separation often seen in the mercury column of a thermometer. When first observed this blanching of the artery was noticed on the disk and slowly moved over the edge, increasing until it was about a disk diameter in length; there was a pause, when suddenly the empty area moved forward, the vessel walls being completely filled, and pushing this area forward, being accurately focussed on this vessel during the entire time the phenomena lasted, the very interesting fact was noted that when the vessel was empty of blood there was no apparent change in its caliber; it remained like an empty cylinder, with no tendency of the walls to collapse or be dented. The

forward progression of this area was slow and uninterrupted until a bifurcation in the vessel was reached, where it divided, with part going to each branch, the following blood column in each branch was unbroken and gradually pushed the empty areas toward the periphery, where they disappeared; in no other vessel was this phenomena observed; there were no hemorrhages or other lesions in the fundus. This eye has been examined many times since, but only once was this interesting condition observed.

About January 1 more marked signs of cerebral disturbance were observed: uncontrollable fits of anger, hiding of his clothes, throwing about the room whatever he could lay his hands on; these attacks increased so that on February 18 of this year, after several attempts at violence to members of his family he was committed to the State Asylum for the insane, after an examination by a board of physicians.

Dr. Schwenk asked Dr. Cross if the empty vessel could be seen? He cited a case where he had made a picture for Dr. Geo. C. Harlan, who reported a case in 1887 at the American Ophthalmological Society, where the retinal vessels were empty and invisible, showing that the presence of the blood in the vessel is necessary in order that the bloodvessel can be seen.

Dr. Holloway stated that he had always been very much interested in changes of this character and had been fortunate enough to see an unusual series of these cases, some of which had been placed on record by Dr. de Schweinitz and himself. He had also seen one of the cases reported by Harbridge. He then exhibited drawings of two eyes, in one of which an anastomotic vessel had formed after the occlusion of an arterial branch. He referred to the interesting obscurations of vision that sometimes preceded occlusion of the vessel, and referred to a patient, now under observation, where these attacks had been occurring about every ten days for many months. Despite the objections of certain observers he felt that spasm of the vessel could not be excluded. After alluding to certain conditions, such as Raynaud's disease, he referred to the observations on trench foot by Sweet, Norris and Wilmer. They believe this condition to be dependent upon an incomplete spasm of the

arterioles in the foot which results in localized increased blood-pressure. In the absence of thyroid extract they used potassium iodide in the treatment of fifty-three cases with the most gratifying results. The patient with long-continued attacks of temporary obscurations of vision had been given thyroid extract for a considerable period of time, but with negative results.

Acute Toxic Amblyopia from Wood Alcohol

Dr. Ernest B. Mongel (by invitation) reported a case of acute amblyopia due to methyl alcohol. The patient, a male, aged twenty-one years, but recently discharged from military service, had only occasionally indulged in alcoholic drinks. On Christmas Eve, 1919, he took three drinks of supposed whisky and on the following day three more. He recalled a foul ether-like odor and taste.

Within thirty-six hours he awoke blind, light perception and projection being absent.

Patient seen by Dr. Mongel twelve hours later.

Pupils were equal around, moderately dilated and faintly responsive to light; tension normal; conjunctiva deeply injected and marked distention of anterior scleral veins. Media of both eyes were clear. The ophthalmoscopic picture was that of a severe and widespread toxic neuroretinitis. The edematous cloud extended well outward from the nerve into the adjacent retina.

Veins were very dark, engorged and tortuous.

Differential diagnosis included diseases of orbit, accessory sinuses of the nose, of brain, of metabolic disturbance, of various systemic poisons, and of the infectious diseases.

Blood examination showed only slight lymphocytosis. Wassermann and von Pirquet were negative.

Sinuses were negative and urine showed only a trace of albumin, with a few hyaline casts.

Patient was admitted to the Episcopal Hospital. Treatment was as follows: Absolute rest in bed; gastric lavage; liquid diet; elimination by salines through bowels.

Pilocarpin, gr. $\frac{1}{2}$ hypodermically, and hot-packs daily.

Supportive treatment, with strychnine, gr. $\frac{1}{30}$, t. i. d.

Alkaline therapy, calcium chloride, grs. x, four times daily.

After two days' treatment he recognized fellow-patients, and upon discharge at the end of six days vision was $\frac{20}{50}$. From this time there was a progressive improvement in all symptoms, until on March 2 corrected vision was in each eye $\frac{20}{30}$.

Reference was made to the methods of manufacture of methyl and ethyl alcohol—and emphasis placed upon the slow elimination of the end-product of oxidation. Formic acid, which while a normal urine constituent, is excreted in much greater quantities after ingestion of wood alcohol.

The following conclusions were drawn:

1. That methyl alcohol is a violent and deleterious poison, producing in the optic nerve and retina the same functional disability or destruction which characterizes the intake of other toxic substances.

2. That since it is slowly eliminated from the body and an end-product of oxidation, as formic acid, also a poison, instead of the rapid and more or less complete oxidation with acetic acid as an end-product, it is much more dangerous in the general circulation than the ethyl alcohol as causative factors in amblyopias.

3. That its specificity of toxic action on the optic nerve is manifested clinically as two distinct types:

(*a*) Neuroretinitis; example, case reported.

(*b*) Retrobulbar neuritis.

With its sector atrophy involving the papillomacular bundle of fibers.

4. That the acute amblyopia is probably an interstitial inflammation of the optic nerve associated with intense edema and serous *infiltration*, Nature trying to neutralize and dilute the poison, as an analogy Dr. Mongel offered the example of poisoning with poison nettles or bee-sting, also due to formic acid and followed with edema and swelling.

The latter types seem to be the hopeful ones from a prognosis standpoint. By proper treatment, promptly administered, the

pressure is removed from the nerve fibers and thereby save them from atrophy.

5. That those cases in which the pressure is allowed to persist or in which the toxic action is specifically on the ganglion cells of the retina and the fibers of the nerve, are represented clinically by an absolute central scotoma and an atrophic temporal half of the nerve. These are hopelessly blind, as medical treatment has been of no avail in such cases.

Dr. S. Lewis Ziegler commended Dr. Mongel's use of calcium carbonate to relieve the acidosis, although sodium bicarbonate in larger doses, well diluted, might have yielded more prompt results. Wood alcohol oxidizes first to formaldehyde, which is corrosive, and next to formic acid which is more corrosive. The latter, if passed in the urine, will reduce Fehling's solution just like sugar, and might lead one to a false diagnosis of diabetes.

The three methods of poisoning are by ingestion, inhalation and absorption through the skin. Tainted toilet preparations are most dangerous, but the "antifreeze" mixtures used in motor engines are a close second.

Dr. Robinson, city chemist, has given us a new test that is sensitive when as little as $\frac{1}{100}$ of 1 per cent. of wood alcohol is present. He renders the solution alkaline, oxidizes by potassium permanganate, adds equal parts of milk, hydrochloric acid and water and gets a permanent pink color if any methylic alcohol is present.

Although grain alcohol can be produced cheaper than wood alcohol it costs more because of the tax. Denatured alcohol is the cheapest but contains disagreeable compounds. Hence the resort to wood alcohol.

Dr. Edward Martin, State Commissioner of Health, should be commended for holding down the profiteers by requiring affidavits from every manufacturer and jobber in Pennsylvania that his preparations are made from grain alcohol and not from wood alcohol.

The treatment should include alkalies, lavage, enemas, pilocarpin and strychnin. If the retina and optic nerve fibers are not too seriously injured negative galvanism may restore their function.

Dr. Holloway thought Dr. Mongel would be interested in the observations of Fridenberg, who believes that the blindness in these cases results from formaldehyde or formic acid in the circulation. In a patient observed by Gifford blindness was also attributed to formaldehyde but in this instance it was supposed to be generated by burning methyl alcohol. It was also pointed out that under present conditions the type of individual coming under observation was apt to be entirely different from former days. Prior to prohibition many of the individuals who would be apt to drink concoctions containing methyl alcohol were confirmed alcoholics, but at the present time, individuals who seldom touch liquor might be blinded as the result of the unusual drink which chanced to be adulterated.

Dr. Chance desired to praise Dr. Mongel for his success in the management of this case. In commenting upon Dr. Holloway's remarks upon the difference in effects in different patients, it might be of interest to be told of a case of blindness which was under Chance's care in 1918. A Slav met a fellow-countryman whom he had not seen since he left the old country. To celebrate their reunion they determined to get drunk. They went into a tavern, in the mining regions, asking for the hardest liquor to be had. The man had no recollection of when he left the bar, when he waked up in a hospital several days later, but he was hopelessly blind. When he came under Chance's observation there was barely light perception, because the nerves were china white. The other man went on his way apparently unaffected.

A Preliminary Report Concerning Mercurophen in Certain Ocular Conditions

Drs. T. B. Holloway and A. G. Fewell, in a preliminary report concerning mercurophen, stated that in the study of the chemotherapy of mercurial compounds, Schamberg, Kolmer and Raiziss produced a substance, sodium (*i. e.*, oxymercury-orthonitrophenolate, or No. 99), which they found to have marked germicidal action. It occurs in the form of a brick-red powder, freely soluble,

and when used in diluted solution has an amber color; it contains 53 per cent. of mercury. In a menstruum of broth this compound was found to be fifty times more active than mercuric chloride and two hundred times more active when used in a menstruum rich in protein, such as serum or ascitic fluid. Further, it was found efficient in sterilizing the hands in a dilution of 1 to 40,000 after an exposure of one minute. The substance is less toxic than bichloride and is free from its corrosive action on metals.

At a joint meeting of this Section with the Section on Otology and Laryngology, in December, 1917, one of us referred to the use of this compound in dacryocystitis. Its use was continued in various types of cases until the war intervened. While the compound is not actually on the market at the present time, it is available in quantities for certain purposes, and inasmuch as our earlier experiences with it led us to believe that it would prove to be of value to the ophthalmologist or ophthalmic surgeon, we have again employed it in appropriate cases during the past six months.

Still more recently it was deemed advisable to employ it in a series of corneal, conjunctival and lacrimal sac cases and at the same time carry on certain laboratory investigations in regard to it, with the hope of possibly ascertaining in just what cases it was most efficient and also to compare it with certain other preparations, old and recently introduced, for which strong germicidal activity has been claimed. With this idea in mind Dr. Fewell has been culturing those cases of corneal ulceration, conjunctival and sac infections, that have come under observation in my clinic at the Wills. Needless to say a series of cases such as we desire is built up slowly, and still more unfortunately we have already experienced difficulty in keeping the patients under adequate observation. If conditions are such that the work now under way can be successfully completed, we shall compare our clinical observations with the laboratory findings in a series of corneal, conjunctival and lacrimal sac cases.

While mercurophen has been used in many cases of different types, judging from his clinical experience with it, Dr. Holloway stated that he felt he was safe in saying that it was particularly

efficient against the pneumococcus. Sac cases clear up very rapidly when treated with it. He had also seen good results in those cases associated with corneal ulcer, although it had not been used in any case of true ulcus serpens. In referring to the laboratory experiments now under way, Dr. Holloway stated that the results obtained would be due to the painstaking work of Dr. Fewell.

A Case of Paralysis of the Sixth Nerve Associated with Otitis Media (Gradenigo's Symptom-complex)

Dr. William Zentmayer presented the following case:

C. S., aged thirty-two years, a milk dealer, had an attack of otitis media beginning January 3, 1920. When seen by Dr. George M. Marshall in consultation with his family physician, Dr. C. B. Schoales, on January 19, there was a copious thick purulent discharge and the upper and posterior wall of the canal was bulging. There was neither tenderness nor pain over the mastoid. A simple mastoid operation was done January 23. A free incision was made into the membrane and the entire mastoid excavated to the lateral sinus, but this was not exposed. The cells were very large even to the tip of the mastoid, and were filled with pus. A free incision was made into the middle ear by way of the aditus, so that with syringe water passed freely through middle ear and canal. Drainage with rubber tube was made in the mastoid region. The patient was freed from pain but on the night following the operation had trouble with the left eye. Paralysis of the external rectus was noticed the next morning. Drainage continued free posteriorly for ten days when it ceased.

On March 8 there was a complete paralysis of the external rectus. No other motor palsies. There were no fundus changes and the visual fields were normal. Vision, R. E., = $\frac{5}{10}$; L. E., $\frac{5}{15}$ + 1 c. ax 90° gave $\frac{5}{4}$ in R. E. and $\frac{5}{5}$ in L. E. The patient had had considerable, but not intense pain over the eyes and in the temporal region. In many of the cases of paralysis of the external rectus with otitis media there has been also intense and persistent

pain localized, not as ordinarily in the mastoid region, but in the frontal, temporal and parietal regions on the same side. To this group of symptoms the term Gradenigo's symptom-complex has been given. It is not necessary that the mastoid should be involved. Without going minutely into the anatomical details of the structures involved it may be pointed out that, according to the description given by Wheeler, the abducens nerve after piercing the dura passes upward and forward and for a distance of 2 or 3 mm. is enclosed by an areola of connective tissue. Just in front of this it is found in contact with the periosteum at or near the apex of the petrous portion of the temporal bone, at which point it enters the cavernous sinus. The small area of contact of the abducens with the petrous bone is marked by a little groove, on either side of which is a spicule of bone and stretching closely over the sixth nerve is a firm ligament. To this ligament is attached the dura mater and the connective-tissue layer which the nerve penetrates. According to Wheeler it is in this area that an exudate or hemorrhage or edema would be likely to interfere with the function of the abducens by pressure or strangulation. The pain in the area of the trigeminus is explained by involvement of the Gasserian ganglion which lies in Meckel's dural cavity and rests in a depression on the anterosuperior aspect of the petrous pyramid at its tip. It is therefore likely to become involved in any process which would affect the sixth nerve at this point.

The infection of the tip of the petrous may occur along one or more of several routes: Extension from the tympanum below the labyrinth and internal auditory meatus to the tip of the bone; from the mastoid antrum through the subarcuate fossa, or by the carotid canal or through a layer of cells extending along the Eustachian tube, thus passing from the tympanum to the petrous tip.

Webster points out that in some cases the paralysis of the sixth nerve has been observed after the mastoid operation has been performed, and he believes that the operation may be the chief causative factor in producing conditions at the point of contact of the sixth nerve which would produce pressure paralysis from hemorrhage or edema.

The paralysis may clear up in a few days and may clear up at once following mastoid operation, but it usually persists for weeks or months.

Spontaneous Absorption of Lens

Dr. J. Hiland Dewey reported the case of J. A., aged thirty years, female, married, first seen February, 1918. At that time she complained of pain in the left eye, severe occipital pain and excessive dizziness; could not go about without an attendant.

At this time vision in the eye was down to light perception; light projection very faulty. Had been seen by an oculist six weeks before, when the pain first started, and was told the eye was all right, but patient states that sight was good at that time.

The pupil was fairly dilated, very sluggish to light, tension normal, anterior chamber slightly shallow. Only a white reflex could be obtained from the fundus, very slight haze in lens down and in; transillumination satisfactory.

The haze in lens was progressive and in about four months the lens was completely cataractous.

Wassermann negative, von Pirquet positive. Patient all this time was very weak and greatly prostrated on the least exertion. Had tuberculin, potassium iodide and inunctions. Pain in eye and occiput together with the dizziness gradually disappeared.

In August, 1919, patient was positive there was an improvement in vision and was anxious for an operation. Light projection became perfect and shadows could be detected. At this time there was a return of pain in eye and occiput and some dizziness.

In December, 1919, there was a change in the appearance of the lens and about two weeks after it could be seen that the lens was beginning to break up into numerous irregular flocculent masses. There was no history of traumatism nor could any trace of a tear in the capsule be detected. Absorption has continued rapidly and at this date, March 19, 1919, there remained only three or four small flocculent masses and the nucleus sinking behind the iris down and

in. Perfect view of fundus can be obtained which appears normal in all respects. Vision with correction $\frac{5}{15}$.

What the nature of the original pathological change was Dr. Dewey could not say, but the cataract developing subsequently seems to have certainly undergone spontaneous absorption.

During this time patient lost no weight but has gained ten pounds in the last six weeks.

APRIL 19

The Frost–Lang Operation

Dr. Howard F. Hansell, after reciting a brief history of the origin of the operation, described in detail the modification of the method practised in the Jefferson Medical College Hospital. Following the circumcorneal incision of the conjunctiva, each rectus muscle is sutured to its overlying conjunctiva. Each tendon with the exception of the internus is severed close to the sclera. A stump, sufficiently large to be grasped by the fixation forceps, of the internus remains after section. Enucleation is performed in the usual way. Hemorrhage, never severe, is controlled by pressure with dry gauze. The anterior extremity of the capsule of Ténon is carefully separated from the conjunctiva and a suture unites the two lips in the center—one end of the suture is uncut. By means of this handle the capsule is drawn slightly forward and the gold ball dropped into the cavity. Each end of the opening is closed by suture. One end of each suture is allowed to remain. The edges of the opening are approximated and brought into plain view by traction on the uncut threads without bruising by forceps. The entire wound is sutured so that no glimpse of the ball is obtained from any direction. The conjunctival edges are now united by three sutures.

Dr. William M. Sweet believed that the employment of a gold ball in Ténon's capsule offered the most satisfactory substitute for the ordinary operation of enucleation, as it ensures greater

movement of the prothesis, provides a shallower orbital floor so that there is less retained secretion, and limits the sinking of the tissues beneath the brow. Before the eyeball is removed the four straight muscles are to be secured to the conjunctiva and underlying capsule, but are not to be tied over the implanted ball, as the latter procedure leads often to displacement of the ball. White silk is to be preferred for the buried sutures, as black silk sometimes shows through the thinned conjunctiva, to the annoyance of the patient. Satisfactory results are reported by the use of chromicized catgut for the sutures in the capsule. At one time it was not believed important to wait until all hemorrhage had ceased before inserting the gold ball, but two recent instances of ultimate displacement of the ball downward probably from distention of the capsular cavity with blood, permitting the ball to sink downward and remain in this position after absorption of the blood, emphasizes the importance of stopping all oozing before the ball is inserted. Dry gauze packing in the bottom of the capsular cavity is the most satisfactory means of stopping hemorrhage.

Dr. Heed suggested the advisability of closing Ténon's capsule by introducing sutures well back (5 mm.) from the free border. In closing the conjunctiva it is essential to suture close to the free margins in order to preserve conjunctival tissue.

Dr. Holloway stated that he had performed this operation many times, and with splendid results. So far he was not aware of any instance, among his cases, in which the ball had been lost. He does not rely upon several sutures in Ténon's capsule, but always uses eight to ten of the interrupted type.

The one annoyance, at times, is the persistent bleeding, and he believed this should be thoroughly checked before suturing Ténon's capsule, and when bleeding seemed difficult to check with ordinary gauze packing he has used gauze and very hot water. When but several sutures are used he believed it quite possible for one or more to tear out should there be marked distention from hemorrhage.

Hess Operation for Ptosis

Dr. Wm. Zentmayer exhibited a woman, aged twenty-three years, operated upon for congenital ptosis. The drooping was very slight in the right eye, but in the left eye, with the aid of the frontalis, the upper half of the cornea was covered. The greater deformity was the hemifacial furrowing of the forehead by the contracture of the frontalis. The result of the operation done on left eye only was very good; the fold produced by the operation and the elevation of the lid were exactly symmetrical with the natural fold and position of the lid of the other side. The lid could be well closed; the folds in the forehead had disappeared.

Dr. Hansell said for the majority of cases of uncomplicated congenital ptosis the Hess operation is probably the most satisfactory. Dr. Zentmayer's result is most gratifying both as to usefulness of the eye and the absence of all deformity. In a patient at present under observation congenital ptosis of the left side was complicated with paralysis of the superior and external recti; dislocation of the accessory portion of the lacrimal gland outside the orbital limits and enormous hypertrophy of the lid resembling elephantiasis. The Hess operation permanently elevated to a moderate extent only the nasal third of the lid. Two excisions of the skin and underlying tissues and of the dislocated lacrimal gland have partly improved the appearance and have given partial use of the eye. Further surgical treatment will be postponed until the hypertrophied conjunctiva is reduced.

Discission by Complete Division of the Lens

Dr. S. Lewis Ziegler presented two cases of soft cataract in which he had performed discission by completely dividing the lens, through and through, with his knife-needle, after the technic of his V-shaped iridotomy. Under full mydriasis the cornea is punctured above. Two V-shaped coverging cuts are then made in the lens from below upward, with a sawing movement in line with

the axis of the knife, avoiding all stirring up of the lens cortex or vitreous. Sometimes the nucleus is turned out and occasionally the lens sectors fall forward into the anterior chamber. Rapid swelling of the cortex and prompt solution of the same soon follow. As the capsular sac is freely opened, both anteriorly and posteriorly, the physical pressure of the swollen cortical can only be exerted forward into the anterior chamber or backward into the vitreous, thus freeing the angle from pressure on the ciliary body and avoiding pain and swelling from this cause. The freedom from postoperative sequelæ is very noticeable. Cocain anesthesia can be relied on if double fixation is made with a horseshoe-fixation forceps.

Case I.—W. R. L. developed soft cataract at three years. O. S. operation under cocain, with pupil fully dilated. Complete division on April 4, 1917. Discharged from hospital three days later. No reaction, eye cleared in one month when cataract glasses were prescribed. He is now six years old and reads well. A retest on March 25, 1920, yielded the following result: O. S., S + 9.D = $\frac{20}{20}$ pt. Add S + 4.D = J-1.

The father of this child was also shown. He had in like manner developed cataract at three years. Dr. Strawbridge had operated on O. S. about thirty years ago, followed by paracentesis, iris prolapse, iridectomy, posterior synechiæ and later retinal detachment. Some years later Dr. Ziegler operated on the right eye without complication. Refraction was S + 9.D at that time. The eye has gradually shown increasing myopia, until now it registers: O. D., S — 1.D ⊂ C — 1.25D Ax, 90° = $\frac{20}{20}$ pt. Add S + 2.D = J-1. Has useful vision without glasses.

Case II.—R. W., aged eight years. Soft cataract in 0^2; peripheral spicules; fundus hazy. Vision: O. D., $\frac{20}{100}$ J-8; O. S., $\frac{20}{200}$ J-10.

Operation under cocain and mydriasis, November 19, 1919. O. D.: V-shaped discission freely made. Returned home on fourth day.

November 26. No reaction; cortical swollen; nucleus in anterior chamber.

January 12, 1920. Pupil clearing.

February 20. Ordered cataract glasses.

March 8, 1920. O. S.: Lens divided by converging V through dilated pupil. Two sections of lens promptly turned out into anterior chamber. Slight reaction on second day relieved by ice pads. Discharged from hospital in one week.

April 19, 1920. Clear rift in cortex O. S. Some pieces of nucleus in anterior chamber. Test for glasses yields:

O. D.: S + 10.D = $\frac{20}{30}$. Add O. D.: S + 4.D = J-1.

O. S.: S + 10.D = $\frac{20}{50}$. Add O. S.: S + 4.D = J-10.

The vision of O. S. will improve when the cortex is fully dissolved.

Capsulomuscular Advancement without Incision

Dr. S. Lewis Ziegler exhibited a case of capsulomuscular advancement of the internal rectus operated on by him on May 15, 1918, with the result of orthophoria, which has been maintained up to the present time. There was marked deviation of O. D., which turned out about 60 degrees and could not be made to converge beyond the median line. So far as the patient knows the condition was congenital.

The operation was a modification of the one presented by Dr. Ziegler before the American Ophthalmological Society in 1914, entitled "A New Operation for Capsulomuscular Advancement Combined with Partial Resection."

Both external recti were first divided and traction made with the tenotomy hook, but this only partly straightened the eyes and the right eye still failed to pass beyond the median line. It was then decided to make an advancement of the right internus, but without incision through the conjunctiva, somewhat after the suggestion of Trousseau.

Following the technic of his former capsulomuscular advancement, but without cutting the conjunctiva or muscle, he grasped the internal rectus of O. D. with the forceps and with a double-armed single suture made a whipstitch on each margin of the

muscle to fix it. The suture was then brought forward to the sclerocorneal junction, where it was anchored securely. Tying the first turn of a surgical knot, traction was then made to pull the muscle and capsule forward until the tissues crumpled up in the line of the parallel sutures and yielded an overcorrection of about 5 degrees. The suture was removed on the tenth day. Convalescence was prompt and with the wearing of her proper correction all asthenopic symptoms were soon relieved. The result has been permanent (two years) as to both orthophoria and convergence power of internal rectus O. D.

Dr. Ziegler claimed that this operation possessed all the advantages of his partial resection operation with none of its disadvantages:

1. Firm scleral anchorage.
2. Whipstitch fixation of each muscle margin.
3. Splint-like support of the muscle by parallel lines of suture laid across the superimposed conjunctiva, capsule and muscle, all of which are advanced together.
4. Straight traction on both muscle edges.
5. Graduated control while the suture is being tied.
6. Single suture, removable externally.
7. Tucking or crumpling of the muscle without an unsightly knuckle.
8. Reposition of the globe through advancement of the capsule.

In view of the simplicity and bloodlessness of this operation, it is to be recommended if one may judge by the brilliant result in the case exhibited. The added power to the sutured muscle may be explained thus: the sutures draw the belly of the muscle forward over its insertion so that eventually by absorption of that part of the muscle the muscle is shortened.

Xerosis Epithelialis

After referring to the various clinical manifestations of xerosis, Dr. Holloway reported the case-history of a colored boy, aged

five years, who was first seen at his clinic at the Wills Hospital on April 4, 1920. He had expected to exhibit the patient but an incorrect address was given. No accurate determination of the visual acuity could be made, but in the absence of any pathologic fundus findings, perfectly healthy and clear media and no decided error of refraction, this was assumed to be good.

On each side of the cornea there was a triangular pigmented area with its base at the limbus. Over the greater portion of this area there was a whitish foam-like substance that could be dislodged by the lid margin or applicator. When free from this substance the area was roughened and rather dry. A uniform brownish pigmentation swept around the lower limbus of the cornea, and beginning at the internal canthus there was a well-defined streak of delicate brownish pigmentation extending along the fornix of the lower lid to a point well below the cornea. In appearance this suggested, at first glance, an argyrosis, but was doubtless congenital.

Dr. Holloway referred to the observations of Stephenson and Hepburn. In conclusion, he stated that he was confident that our experience with this condition in this country, at least in Philadelphia, was distinctly at variance with that of some of the English observers in regard to its frequency. In Philadelphia it was really a very unusual clinical manifestation.

Dr. Zentmayer said: The only case of xerosis of the conjunctiva of this type that he had seen was in the eyes of an infant. The condition was similar to that in Dr. Holloway's case. The child was malnourished in the opinion of Dr. Louis Starr from congenitally deficient pancreatic secretion. Death occurred at the age of about three months.

An Unusual Case of Xanthelasma

Dr. J. Milton Griscom exhibited the photograph of a case of xanthelasma of interest because of the extreme size of the growths and the distinct hereditary tendency to this disease in her family.

In the right eye the tumors measured 28 x 12 mm. on the upper lid and 20 x 7 mm. on the lower lid. In the left eye the growth on the upper lid measured 25 x 7 mm. and on the lower lid 17 x 6 mm. There were two small nodules at the external canthi of each eye measuring 3 mm. each. The main growths had a nodular, uneven surface and were elevated from 3 to 6 mm. Complete excision was performed, with excellent cosmetic results.

Dr. Griscom had not been able to find in the literature of the past fifteen years any record of a case so extensive, and he had not found any reported cases of a hereditary character.

Neoplastic Degeneration of the Cornea

Burton Chance presented for diagnosis the case of a woman exhibiting colloid epithelial masses on each cornea. There were two masses on each situated symmetrically midway between the lower limbus and the summit, at about the vertical diameter. These masses were approximately 2 mm. in diameter, and elevated, very much in the manner of herpes, but of a doughy white appearance. They were without inflammatory symptoms, and had occasioned only itching and slight burning sensations. Over a period of three weeks' observation, on alternate days, no changes occurred in the masses or in the surrounding tissues. The eyes were not otherwise affected, but the glandular structures of all four lids were congested and more or less tumid. For many years the patient had suffered from redness of the skin of her face which has in recent years become gradually and steadily less, but which has left her skin rough and the pores prominent. She presents the aspect of one who has recovered from acne rosacea. There had been no stunted or inturned eye-lashes observed rubbing against the corneas. From each cornea the somewhat larger of the masses was excised by shaving with a Graefe knife. The underlying corneal membrane was found to be entirely unaffected. The histological study has not yet been made. Treatment so far has consisted in applications of boroglyceride to the lids of the left

eye, which applications have very greatly improved the health of the lids. The left cornea is now entirely clear. As the process gave no special annoyance nothing was applied to the right in order to observe the process of the affection. The patient has been taking sodium hyposulphite, 15 grains, in capsule, three times a day. Chance does not regard the case to be one of herpes, but believes it to be an accompaniment of acne rosacea.

Dr. Zentmayer said he had never seen a degenerative process as a complication of acne rosacea. He had recently seen in a man, aged fifty-five years, a hyaline degeneration in the cornea starting as small, rounded, elevated, porcelain-like spots not more than 1 mm. in size. He thought it probable that Dr. Chance's case was of a similar nature.

Neoplastic Degeneration of the Iris

Dr. Chance showed the case of a man who reported for the relief of an ulceration of his left cornea, in whose right eye was found a bluish-gray mass in the iris filling the angle of A. C. at the nasal side, on the horizontal meridian. The circle of the pupil showed a notch at the site of the mass, and on full mydriasis the mass projected well into the pupil space. There were no signs of inflammatory reaction and there was no pain, the man being unconscious of the presence of the mass. Tension of the globe was not increased. Chance offered it as a case of melanosis, which is at present benign, yet he is not without the fear that it might become malignant.

Dr. Edward A. Shumway said that he thought Dr. Chance's case should be considered one of melanosis of the iris of unusual size. The patient had said, on question, that the spot had not increased in size but that it was a condition that demanded careful watching lest it develop into a malignant growth.

Unusual Type of Atrophy of the Choroid

Dr. Chance exhibited a case of extensive atrophy of the choroid in each eye also. The left eye presented elliptical vacuolate figures in the stroma, in the bottom of which were the worm-like vessels of the choroid. Considering the extent of the process the fundus was singularly free from pigmentation.

OCTOBER 21

Orbital Sarcoma Treated with Radium

Dr. Howard F. Hansell exhibited a case of tumor of the orbit, probably sarcoma, of two years' duration. The patient had been treated by *x*-rays for one year and for the last six months by radium. The only benefit of the treatment has been to prevent rapid growth. The treatment will be continued and operation postponed until the last moment.

Perforation of Globe by a Particle of Dynamite Cap

Dr. Burton Chance described, briefly, a case the like of which he had not had before, and exhibited the eyeball which he had excised from the orbit of a Polish boy of five or six years who recently while striking a dynamite cap between two stones was wounded in his left eye. The history of the interval between the wounding and his admission to the Wills Hospital, early in October, is not obtained as the child's family could not speak English. When admitted the orbital base was depressed, the fissure contracted, the globe somewhat shrunken. There were no scars perceptible on the globe. The cornea was clear; the anterior chamber of unequal depths; the iris bright green. No reflex was obtained from the fundus. At the enucleation the superficial tissues

were densely adherent to the globe, especially over the nasal aspect. The nerve was cut without difficulty, but on attempting to deliver the globe it was found to be held fast deep in the apex. After many efforts, during which it seemed as though one had to do with a neoplasm, the globe was finally delivered. The tissues were prolonged about 8 mm. very much as in the manner of a protruding growth. At the apex of the more or less triangular mass pus oozed on pressure. On section of the globe and mass a bent copper cap was found in the pocket containing the pus. The globe was more or less quadrate; no positive cicatrix could be seen, but the muscles and orbital tissues had been lacerated and were massed together in the posterior nasal aspect without including the nerve. The almost globular crystalline lens had been dislocated and the choroid and retina detached and shrunken. The child made a good recovery.

Effects of Carbon Monoxid upon the Eyes

Dr. W. H. Wilmer, of Washington, D. C., by invitation, presented a valuable communication from which the following extracts are taken. The paper dealt with:

1. The frequency of exposure to carbon monoxid gas in all walks of life, domestic and industrial.

2. The voluminous general literature upon the subject, but the dearth of any detailed descriptions of the ocular lesions.

3. Its combination in the blood. Two opposing theories concerning its deleterious action upon the body lesions; by depriving the blood of its oxygen-carrying properties; or by a direct chemical action upon the delicate central nervous tissue.

4. The pathological changes found in the central nervous system of fatal cases consist of great congestion of the vital organs; in the nervous system, inflammation, thrombi, hemorrhages, fatty degenerations and atrophic changes.

5. A detailed account of the chronic poisoning by the gas from a faulty hot-air furnace of an entire household over a period of

two months. Special note of the hallucinations of vision, hearing and touch.

6. A report of the case of one of the children (four years old at the time of exposure) who suffered from a double optic perineuritis.

7. The report of a case of a man of thirty-five years of age whose optic atrophy was due to carbonic oxid from the fumes of a gasoline torch.

The paper closed with the following conclusions:

The exposure in modern life to the influence of carbon monoxid introduces an additional cause of eye lesions. As carbon monoxid is present in all of the gases connected with domestic and industrial activities it has possibly been responsible for certain obscure amblyopias that have been attributed to other often quoted chemical substances. And its causal relation may be obscured at times by some other very evident source of toxemia, such as septic tonsils, apical abscesses, syphilis, etc.

It is not of vital importance to the ophthalmologist whether carbon monoxid manifests its serious effects as a distinct chemical poison or whether it deals destruction purely by its power of quickly depriving the blood of its essential oxygen-carrying power. But it seems to the writer, after much experience with pure oxygen want, artificially produced, that there is much truth in the two opposing theories. On the one hand, the physiologist sees the dramatic effect of carbon monoxid upon the person who takes one whiff of the concentrated gas and falls as if electrocuted; or he is interested in those cases which finally become unconscious after a longer exposure to fumes of lesser strength. Moreover, he sees the results of experimentation in the laboratory, and he is quite rightly impressed by the effect of this gas upon the oxygenation of the blood. But he does not come in contact with the final consequences of the prolonged, but intermittent, exposures to infinitesimal doses of this gas—results which are of such interest to the clinician. In these cases, the symptoms run the gamut of clinical medicine.

The history of carbon monoxid convinces one that, apart from

the effect upon the hemoglobin, it is chemically inert compared with the toxicity of other well-known chemic substances. However, one cannot but feel that after a prolonged attack upon the body tissues it exerts a deleterious influence which is apart from its purely oxygen-depletion effect—though the latter does sensitize the delicate structure of the central nervous system.

Carbon monoxid does not show any great predilection for exhibiting its toxic influence upon the optic nerve fibers as a whole, nor even upon the very sensitive papillomacular bundle which is so markedly affected by alcohol, nicotine, etc. The ocular nerve lesions seem to be due to changes in the delicate structures of the nuclei of origin of these nerves.

However, through its effect upon the sensitive fabric of the central nervous system, carbon monoxid does cause ocular paralyses, hemianopsias, disturbances of normal pupillary reactions, optic neuritis, and, actually, optic atrophy. Like pure asphyxiation, it is the source of great ocular congestion, and in this way it does cause subconjunctival and retinal hemorrhages; while in the milder cases of carbon monoxid poisoning congestion of the respective cerebral centers causes hallucinations of vision, hearing and touch.

The writer feels that the first case reported is one of optic neuritis due entirely to carbon monoxid poisoning. This seems to be a logical conclusion to draw from the history of the case, the great general disturbance, the very slow recovery, the elimination of every other toxic source, and the recognized susceptibility of children to this gas.

In the second case, carbon monoxid is the probable cause of the optic atrophy, by reason of the very clear history of ocular and other disturbances that followed each exposure to its fumes, and the exclusion of all other toxic sources.

The treatment seems to resolve itself into remedies suggested by the symptoms, prophylaxis, hygiene, and the legislation that should follow the proper education of the public in regard to the insidious toxicity of this "Frankenstein" of advanced civilization.

In closing the discussion, Dr. Wilmer said that he felt

"humbly conscious" that his paper was not worthy of the very fine discussion that followed its reading. He rather attributed its reception to the spirit of brotherly love combined with the splendid scientific atmosphere which was recognized by all to exist in Philadelphia—both of which were deeply appreciated.

Dr. H. A. Hare spoke in regard to the relationship of carbon monoxid and illuminating gas, fuel gas and coal gas. In all cases of gas-poisoning carbon monoxid seems to be the chief factor, but in very few instances is it the only gas which is responsible for the symptoms, the chemical composition varying with the coal used, and the temperature employed in generating the gas. The point is whether it is coal gas or the illuminating gas, commonly called water gas. Water gas contains a much higher percentage of carbon monoxid than does gas made from coal. Thus Professor Remsen put the percentage of carbon monoxid in coal gas at 7.9 and in water gas 28.25.

He spoke of the greater affinity of carbon monoxid for hemoglobin than for oxygen, and referred to the article in Witthaus's *Medical Jurisprudence and Toxicology*, vol. iv, who states that in some cases of survival certain disturbances, notably those of the nervous system, persist for months or years due to hemorrhages and softening caused by the impoverished condition of the blood, but more usually the patient recovers completely in the course of a few days.

After describing the symptoms in general, consisting of l ss of muscular power and unconsciousness, he adds that vision is impaired during recovery and in some cases there is deafness. So too Herold states that vision is disturbed.

Further on Witthaus states that a very characteristic lesion in prolonged carbon monoxid poisoning is the occurrence of hemorrhages and softening in the cortex and central nuclei of the brain, notably in the *two internal segments of the lenticular nucleus*. These lesions are frequently symmetrical and due to degenerative changes in the coats of the arteries.

He then gives about a dozen references, all of which are to German literature, as justification for this statement on his part.

It is interesting in connection with the statement made above concerning lesions of the lenticular nucleus, to note that the distal group of vessels coming off of the circle of Willis or the lenticulo-striate arteries send branches to the outer segment of the lenticular nucleus and that the lenticulo-optic arteries pass to the outer and posterior parts of the lenticular nucleus and the outer part of the optic thalamus.

In this country, Dr. Dana, of New York, while dealing with another aspect of nervous lesions, has contributed information of interest in this connection. Thus, he has pointed out that it is very common, if not almost universal, to find as an effect of gas poisoning, a softening of both lenticular nuclei if the patient has been unconscious from the effects of the gas for more than twenty-four hours. He quotes Ziemssen as having reported a case of gas-poisoning with softening of the corpus striatum in 1864, while Simon reported that gas-poisoning caused thromboses and softening of the brain, particularly of the lenticular optic region, in 1868. Thus, in a case of gas-poisoning in a woman aged forty-six years the autopsy showed in the left side of the brain a spot of softening the size of a cherry in the middle of the corpus striatum, which at the limit of the thalamus behind was more solid. A similar but smaller lesion was in the right striatum, with no other spots of softening.

To quote Dana: "In 1898, Kolisko published a series of articles upon the bloodvessels of the brain. In this he particularly called attention to the existence of a special artery which is given off from the anterior cerebral, near the communicating branch. This artery is usually single, but sometimes double. It runs upward and backward, and it supplies the caudate nucleus, part of the anterior portion of the internal capsule, and part of the outer portion of the lenticular nucleus. Owing to the length and peculiar direction of this artery, the blood that passes into it has to flow rather against the normal current. The result is that the pressure in this artery easily becomes relatively less than that of the other vessels, and when the general blood-pressure is very low, as in gas-poisoning, a tendency to stasis and thrombosis occurs.

This artery is the one, then, that is particularly selected as that in which thromboses occur, and Kolisko states that it has so much right to the name of "the artery of cerebral thrombosis" as the branch from the middle cerebral has to the name of the "artery of cerebral hemorrhage." It is an involvement of this artery on each side which occurs in cases of gas-poisoning, and which leads to the very common lesion of bilateral softening of the corpora striata in that condition."

Dana also quotes Klebs as reporting a case of softening of the corpus striatum with a sharply limited focus and two others with lesions in the inner parts of the lenticular nucleus and anterior part of the internal capsule.

Dana expresses the belief that it is well known that the most common and practically uniform lesion in gas-poisoning is that of the lenticular nucleus.

Dr. Hare said he appreciated that these reports have not, perhaps, as direct a bearing upon the paper of Dr. Wilmer as might be desired, but it seemed that they possess collateral interest.

Finally, it is interesting to note that inquiries made of Dr. Marshall, who is the physician employed by the United Gas Improvement Company, as to whether visual disturbances are met with in those employees who are exposed to gas fumes. Naturally the experience of Dr. Marshall is a very wide one, and he said that he does not recollect a single instance where disturbance of vision was noteworthy.

Another point of interest which has nothing to do with ocular lesions is the difference of opinion which seems to exist as to treatment in acute poisoning. The difficulty with inhalations of oxygen is that it cannot displace the carbon monoxid which has formed a compound with the hemoglobin. Recently, Henderson and Haggard, from experiments on animals, conclude that during the development of carbon monoxid asphyxiation there is vigorous excess of respiration, that following this, owing to deficient oxygen and other causes, there is a diminished CO_2 production in the body. They point out the inadequacy of oxygen inhalations for the reasons given above and claim that in animals the inhala-

tion of CO_2 diluted with air has no immediate effect in that it increased the respiration as to depth and rapidity and so hastens the inhalations of carbon monoxid. Whether this somewhat contradictory view will hold true in practice with human beings remains to be proved.

Dr. F. X. Dercum said it was not surprising that in lethal cases lesions have been found in the basal ganglia and capsules, as this region is the favorite seat of vascular crises of all kinds and from whatever cause. This fact is due to the preponderating role which the middle cerebral artery and the branches which enter the anterior perforated space play in the vascular supply of the brain. Gross hemiplegias are met with in such cases and that characteristic lesions are found at autopsy is not surprising. The lesions are, however, not limited to these regions. This is indeed indicated by the symptoms which vary greatly. Palsies gross in character, hemiplegias, local palsies of one or more limbs and even paraplegias have been described. The palsy may be flaccid or spastic; there may be fibrillary contractions, tremor, muscular twitchings and muscular spasms irregularly recurring or persistent. Finally there may be convulsions. Cases with gross lesions usually die and autopsies reveal hemorrhages into membranes and nerve tissue, foci of softening due to thrombosis, degeneration of nerve cells and fibers, chromatolysis, atrophy. The facts suggest the action of a toxin—possibly of a secondary toxemia—on the vessel walls. In cases that survive symptom-groups leading to the diagnosis of multiple cerebrospinal sclerosis may make their appearance. Probably we have here to deal with multiple foci, multiple small lesions, primarily vascular. A more frequent clinical picture is that of a multiple neuritis and it is this which in the light of Dr. Wilmer's interesting paper especially concerns us. Many such cases have been described especially by French writers, and for reasons to which Dr. Wilmer has alluded. It is worthy of special note that the neuritis is usually not diffuse but localized; indeed, when a diffuse multiple neuritis is present, it is quite legitimate to think of a possible and preëxisting alcoholism. Most frequently the picture of a neuritis

caused by carbon monoxid poisoning is that of a neuritis of one or more nerves of a single extremity. It would appear, also, from the observation of various writers, for example, Claude, who has especially studied this question, that the neuritis is not primary but is secondary to lesions of nerve centers, a conclusion parallel to that of Dr. Wilmer for the neuritis of the optic nerve. The peripheral neuritis when present appears to be the outcome of lesions of membranes, hemorrhages or softenings in the nerve centers, or possibly to edema of contiguous tissues leading to compression.

Far more common, however, than organic changes, are the conditions which suggest a functional disturbance of the nervous system, which are not infrequently overlooked. Doubtless they are toxic in their origin, but whether due merely to the interference with the oxidation of the tissues caused by the carbon monoxid inhalation or to a secondary intoxication, it is impossible to say; more probably to the latter. Dr. Wilmer has already graphically described the symptoms which such cases present. In brief they are featured by headache, backache, vertigo, tinnitus, weakness, atonic indigestion, impaired circulation, sleep disturbances. In individual cases, given symptoms may be especially pronounced. At times, too, as Dr. Wilmer has recounted, mental symptoms may be prominent and striking. There may be mental depression, irritability, impairment of memory, hebetude, apathy, marked mental impairment, confusion, hallucinations. At times a loss of memory is present suggesting a lacunar loss, and in which the lacunæ are filled in spontaneously and automatically from the subconscious mental content so that the picture of fabrication as seen in Korsakow's psychosis—itself a mental disorder frequently associated with polyneuritis—is simulated.

To Dr. Dercum it seemed that the so-called functional symptom-groups are practically of the utmost importance. They suggest toxemia plus exhaustion. Finally, we must be careful to differentiate such cases from the hysterias that are occasionally found in cases that have been exposed to gas-poisoning. Here the picture is that of palsies, contractures, or other motor phenomena,

associated with typical hemi- and segmental anesthesias; and other crass hysterical phenomena. Clearly such cases are to be referred to mental shock and fright just as are cases of so-called traumatic hysteria and not directly to carbon monoxid poisoning. In conclusion Dr. Dercum wished to emphasize the fact of our indebtedness to Dr. Wilmer for bringing before us such an important subject and in such a valuable paper.

Dr. de Schweinitz congratulated Dr. Wilmer on his interesting and timely paper, which he deemed especially important in that it forcefully called the attention of ophthalmologists to the ever-present dangers of carbon monoxid poisoning, so often insidiously conveyed, and therefore all the more deadly. These dangers have frequently been studied and reported upon by physiologists, chemists, neurologists, and those interested in industrial medicine, but the ocular symptoms have not received the attention which is their due. In many respects the gathered information on this subject, that is carbon monoxid poisoning, is most satisfactorily compiled up to 1914, in Glaiston and Logan's work on "Gas Poisoning in Mining and Other Industries," and contains a good résumé of the ocular symptoms, and in this city we are indebted to Spiller and McConnell for an excellent study from the neurologic and pathologic standpoints.

Dr. Wilmer has so well summarized the eye symptoms thus far recorded, as well as those he has observed, that there is little to add. Not the least interesting pupil phenomenon in acute carbon monoxid poisoning is the occasional development of an exaggerated hippus; nystagmus, for example, in those exposed to mine gases, is important because it would seem from recent investigations that miners' nystagmus, usually attributed to the strain caused by deficient light, or to muscle fatigue, or to insufficiency of fusion power, may be the result of a form of carbon monoxid poisoning. The optic nerve changes which Dr. Wilmer observed in one of his patients and in one under the care of Dr. Burke are a further confirmation of the fact that the damage may be a permanent one, as it was in the report of Brose, who found atrophic pallor in men exposed to the gases developed by the

explosion of dynamite, and in that of R. Pirrie, who noted permanent optic nerve atrophy in two patients exposed to the fumes following nitroglycerin gas blasting; in all of these instances it was believed that CO might be the responsible agent, although some other gas or vapor was not entirely excluded. That the hemianopsia of carbon monoxid poisoning is due to hemorrhages or areas of softening in some portion of the visual pathways seems well established, as pathologic investigations have demonstrated fatty degeneration of the intima of the vessels in the central nervous system. The bilateral softening of the lenticular nuclei in fatal cases of carbon monoxid poisoning, to which Dr. Wilmer has referred, first described in this country by Dana, is well shown in an illustration from Spiller and McConnell's article, and is a frequent and almost characteristic lesion, although not with reference to hemianopsia. To what extent the ocular phenomena produced by this gas are due to its power of reducing the oxygen-carrying power of the blood is not apparently known, and yet if Yarrow's contention (quoted by Dr. Wilmer) is correct, the blood impregnated with this gas loses its power as an oxygen-carrier to the tissues of the body, it may well be accused in this respect. From all standpoints, and therefore from an ocular one, it is well to remember that persons exposed to the influence of CO may apparently recover entirely, the recovery to be followed by the symptoms of the poisoning, or, in other words, a delayed reaction.

A practical lesson from Dr. Wilmer's paper evidently is that in the investigation of certain obscure optic nerve troubles and muscle palsies and certain types of unexplained visual field amblyopias, the possible relation of a slow and insidious carbon monoxid poisoning must not be neglected, nor must it be forgotten in attempting to explain, not only visual hallucinations, but so-called colored vision, for example, xanthopsia, which Hilbert has noted exactly as it occurs in santonin poisoning, and sometimes in other varieties of toxic amblyopia.

Dr. Howard F. Hansell said that Dr. Wilmer had done this community a real service in calling attention so emphatically

to the danger to which we are all exposed either in the home or in the factory—to the danger of poisoning by carbon monoxid. He personally felt under deep obligation and would endeavor to profit by these thoughtful suggestions. Dr. Hansell had never knowingly seen a case, but he believed with Dr. Dercum that we pass many cases by without recognition. There is thus far no syndrome of ocular symptoms. The ophthalmologists who have written on the subject have described not more than one or two symptoms. The eye complications; paresis of the extra-ocular and intra-ocular muscles; disturbance of vision; concentric contraction of fields; double homonymous hemianopsia; mydriasis, miosis and paradoxical pupillary reactions; protrusion of the globe and nystagmus have been mentioned. The eye-grounds are usually negative although venous hyperemia of the retina and exudation into the retina adjacent to the nerve have been reported. In addition, functional derangements may be attributed to the gas in those who are subjects of poisoning.

Dr. L. C. Peter wished to add his vote of appreciation to Dr. Wilmer for his very interesting communication this evening. The cases which he presented were of very great interest. Three phases of the case in which the visual fields were presented should receive special consideration. First, the total absence of gross fundus changes visible with the ophthalmoscope. In retrobulbar types of optic neuritis it is the rule to find no gross fundus changes. This case, however, covered a period of about two years during which he was under observation and the fields even now show considerable pathology. One would, therefore, expect to find some fundus changes.

Second, the papillomacular bundle is the first to show evidence of disease in toxic types of amblyopia; in this case the macula apparently escaped.

The third interesting point is the enlargement of the blind spots of Mariotte. Dr. Peter had been in the habit of calling the attention of the student body in the classification of optic neuritis to this particular type, which as a rule is rare, namely, a perineuritis

giving rise to an enlargement of the blind spot. This patient is a concrete example of this rather unusual type of neuritis.

The fields, as presented by Dr. Wilmer, are of very great value not only from a diagnosis standpoint but from the standpoint of prognosis as well. Without involvement of the papillomacular bundle one would expect that the patient should make a fairly good recovery with little demonstrable damage to vision.

Dr. Edward A. Shumway said that he wished to place on record a case of carbon monoxid poisoning, which he had seen at the University Hospital Eye Dispensary in May, 1918. The patient was a child, aged six months, of Jewish parentage, who had been in good health until three months of age, when the family were overcome during the night by coal gas from a defective heater. Their physician who had been called in, found the older children vomiting, and the baby in a stupor, from which it was aroused after a few hours. Following this, the child had been unable to hold its head up, sit up, or use the lower limbs. Examination at the dispensary showed the child to be apparently blind and deaf. There was no response of the pupils to light. Eye-ground examination showed suspicious pallor of the disks, and special attention was paid to the macular region, for the possible presence of a cherry red spot, to exclude amaurotic family idiocy as the true condition, but none was found, nor did it appear later, nor did the nerves become atrophic.

Dr. Spiller had examined the child, and had made a diagnosis of cerebral diplegia, probably due to carbon monoxide poisoning. The child has been seen at intervals since 1918, and while there was some improvement in muscular movements, there was permanent blindness and deafness. At no time, however, had there been any spasticity of the affected limbs, which was frequently found in cases of degeneration of the lenticular nucleus, and had been a notable feature in S. A. K. Wilson's cases of progressive degeneration of the lenticular nucleus of the family form.

November 18, 1920

The Anatomic Relations of the Optic Nerve and Commissure to the Paranasal Sinuses

J. Parsons Schaeffer, M.D., Ph.D., Professor of Anatomy, Jefferson Medical College, Philadelphia, addressed the Section by invitation, and said that the retina from the viewpoint of embryology is a part of the brain, and the so-called optic nerve is a brain fiber tract supported by neuroglia elements and incomplete fibrous septa and surrounded by tubular prolongations of the cerebral meninges and the meningeal interspaces. There is nothing in the visual apparatus which strictly corresponds to a peripheral nerve.

The axones composing the "optic nerve" commissure and tract arise from the ganglionic cells located in the retina and with the latter constitute neurones of the third order in the visual pathway. The fibers or axones converge toward the optic disk, pierce the vascular and fibrous tunics of the eyeball, then course centrally as the "optic nerve," the optic commissure and the optic tract, to terminate in the thalamus, the metathalamus and the midbrain. Identically the same axones or fibers form without interruption, and, in order, the "optic nerve," the optic commissure and the optic tract. It would, therefore, be more appropriate to designate the entire pathway, "the optic tract." The fibers of the tract are medullated, but lack a neurolemma, being in general agreement with brain and spinal cord fiber tracts, in which the neurolemma is absent or greatly reduced.

In animals, man included, with an overlapping of the fields of vision of the two eyes and stereoscopic vision, the decussation of the optic pathways in the commissure is incomplete, while in vertebrates below mammals, the decussation is complete or nearly so. The more laterally placed the eyes the more nearly complete is the decussation.

Therefore, in dealing with the anatomic relations which exist between the optic nerve and the optic commissure and the paranasal sinuses, one is concerned with a partially decussated brain fiber tract with cell bodies located forward in the retina, rather than with a peripheral nerve. The efferent neurones of the optic nerve with cell bodies located centrally need not concern us in this connection.

The so-called optic nerve leaves the eyeball approximately 3 mm. to the mesial side of the posterior pole and follows a slightly serpentine course dorsalward, medialward, and cranialward toward the optic foramen or canal in the apex of the orbit. After traversing the optic foramen medial and cephalic to the ophthalmic artery, the optic nerve courses intracranially, converges toward the midline, and after a variable distance meets with its fellow in the formation of the optic commissure or chiasma. It is, therefore, obvious that the two optic nerves are far apart ventrally where they leave the eyeballs and gradually converge more and more, ultimately to merge in the vicinity of the tuberculum sellæ (olivary eminence), between the internal carotid arteries. It is equally clear that for some distance behind the eyeballs the optic nerves are separated from the thin osseous walls of the paranasal sinuses by the interposition of a goodly amount of orbital fat. Moreover, that as the optic foramen and the optic commissure are neared, the topographic relationships between the optic nerve and commissure and the paranasal sinuses become more and more intimate, ultimately resulting in very many cases in the optic nerve and commissure, coming into actual contact with the thin osseous walls or the mucous membrane (when osseous dehiscences are present) of certain of the paranasal sinuses, especially the posterior ethmoidal and the sphenoidal.

The optic nerve topographically may be divided into *ocular*, *orbital*, *foramen* and *cranial segments*. The whole nerve varies in length, the greatest variation occurring in the length of the cranial segment, the optic commissure being formed at a variable distance dorsal to the optic foramen. The following table is illustrative of this variation (Table A):

TABLE A

Cadaver.	Total length.	Ocular.	Orbital.	Foramen.	Cranial.
M	49 mm.	—	27 mm.	6 mm.	16 mm.
N	38 mm.	—	28 mm.	6 mm.	3 mm.
O	43 mm.	—	30 mm.	5 mm.	8 mm.
P	33 mm.	—	25 mm.	4 mm.	4 mm.

For our purposes here it is well to divide the optic nerve into *sinus* and *non-sinus portions* and to compare these segments with the entire length of the nerve, using *sinus portion* to mean that segment of the nerve which is 2 *mm. or less* from the walls of the paranasal sinuses. The following table indicates this comparison and relationship (Table B):

TABLE B.—LENGTH OF OPTIC NERVE (IN MILLIMETERS)

Cadaver.	Total length		Non-sinus portion.		Sinus portion.	
	Right.	Left.	Right.	Left.	Right.	Left.
A	45	45	24	21	21	24
B	37	35	14	13	23	22
C	44	44	21	22	23	22
D	40	40	19	23	21	17
E	55	48	28	27	27	21
F	43	41	15	15	28	26
G	48	46	24	20	24	26
H	39	42	15	14	24	28
I	38	40	16	20	22	20
J	40	40	30	10	20	20
K	37	36	14	14	23	22
L	54	48	28	27	26	21

The great variations in size, shape, number and type and the variations in symmetry and asymmetry of the paranasal sinuses preclude any constancy in the topographical relationships of the optic nerve and the commissure to the sinuses. Unfortunately it is not the province in this brief abstract to discuss at length the variations in the anatomy of the paranasal sinuses. In passing, however, it should be mentioned that at best the osseous walls of the paranasal sinuses are thin; indeed, often of a filmy character. Again, the osseous walls may be developmentally defective, lead-

ing to a condition whereby the mucous membrane of the related sinuses comes into actual contact with the dural investment of the optic nerve and the optic commissure. Indeed, the lateral wall of the sphenoidal sinus may be so defective that the mucous membrane lining the sinus protrudes as a hernia or a diverticulum. The thickness of the plate of bone between the optic foramen and the contained optic nerve and the cavity of the sphenoidal sinus varies, according to the material studied, from a total absence to 2 mm.

One or more of the posterior group of ethmoidal cells are nearly always intimately topographically related to the optic nerve. When a posterior ethmoidal cell extends into the body of the sphenoid bone at the expense of the lumen of the sphenoidal sinus the ethmoidal cell in question replaces the sphenoidal sinus in the optic nerve relationship. In general the most dorsal of the posterior ethmoidal cells concerns us most in this connection. However, at times other posterior ethmoidal cells not in actual contact with the sphenoidal sinus establish very intimate topographic relationships with the optic nerve as well.

The optic nerve crosses the upper and lateral angle of the sphenoidal sinus. In very many cases the thin wall of the sinus is pushed into a mound-like relief by the nerve, so that in a sense the nerve passes through the sphenoidal sinus, separated from the contained lumen merely by thin bone, and when osseous deficiencies exist only by the mucous membrane. The asymmetry of the sphenoidal sinuses may be so great that either the right or the left sinus not only establishes intimate and vital relationships with the optic nerve of the same side but also with the optic nerve of the opposite side. For example, one encounters specimens in which the right sphenoidal sinus comes in actual contact with the right optic nerve, the optic commissure and the left optic nerve, the left sphenoidal sinus being wholly crowded from the usual intimate topographic relationship. The opposite anatomy also prevails with equal force.

The optic commissure bears a variable relationship to the

sphenoidal sinuses. The inconstancy of the relationship is due, first, to the great variations in size and shape and to the asymmetry of the sphenoidal sinuses, and, second, to the variations in the distance behind the optic foramen at which the optic commissure is formed (see Table A). In very large sphenoidal sinuses, especially in the ventrodorsal plane, the optic commissure is located in the roof of the sphenoidal sinus and some distance in advance of the dorsal wall. On the contrary, in small sphenoidal sinuses, the optic commissure lies dorsal to the sphenoidal sinuses. Moreover, the intracranial segment of the optic nerve is relatively long and the optic commissure formed far dorsal, the commissure rests upon the hypophysis cerebri and the intimate topographical relationships between the optic commissure and the sphenoidal sinuses are thereby precluded. The location of the optic commissure immediately above the hypophysis is very common. It is when the intracranial segment of the optic nerve is short and the optic commissure formed over the tuberculum sellæ ventral to the location of the hypophysis cerebri that the very intimate topographical relationships between the optic commissure and the sphenoidal sinuses are made possible. Of course, in those cases in which the sphenoidal extend forward into the ethmoidal masses, thereby replacing certain posterior ethmoidal cells, the optic commissure is always in the roof of the sphenoidal sinuses. Owing to the almost constant asymmetry of the sphenoidal sinuses it is rather common to find one or the other of the sinuses wholly replacing its fellow in the topographical relationships with the optic commissure. In symmetrical sinuses both sinuses may share the usual commissural relationships.

The ostium of the sphenoidal sinuses is disadvantageously located for good drainage, being placed a goodly distance from the sinus floor. Indeed, in some cases pus in the sinus would rise almost to the location of the optic foramen before it could escape through the aperture of the sinus into the nasal cavity. The following tables illustrate this relationship (Tables C and D):

TABLE C

Side.	Distance from center of ostium sphenoidale to roof of sinus.	Distance from center of ostium sphenoidale to floor of sinus.
R	12	17
L	10	13
R	12	12
L	12	9
R	2	3
L	16	13
R	2	20
L	12	17
R	3	6
L	12	4
R	15	17
L	17	16

TABLE D

Cadaver.	Distance Between Optic Nerve and Ostium Sphenoidale. Right.	Left.
A	8	12
B	9	5
C	9	11
D	15	15
E	2	2
F	4	0
G	6	0
H	12	12
I	4	4
J	2 above	1 above
K	3 above	2
L	6	13

The frontal sinus when of the supra-orbital type and well developed dorsomedially may establish intimate topographical relationships with the optic nerve in the neighborhood of the optic foramen. As a rule, however, the frontal sinus is not vitally related.

In the vast majority of instances a goodly amount of orbital fat separates the maxillary sinus from the optic nerve. Rarely, however, when the maxillary sinus pneumatizes beyond the confines of the maxilla into the orbital plate of the palate bone and into the neighboring ethmoidal mass it comes in contact with the optic nerve, thin bone alone intervening.

The most dorsal of the anterior group of ethmoidal cells occasionally are a factor in optic neuritis. This when the anterior group of cells encroach upon the more usual confines of the poste-

rior group. It should always be recalled that it is not the location or topography of the ethmoidal cells that determines the groups, but the location of the ostia of the cells in the nasal cavity; the anterior group draining into the nasal cavity caudal to the attached border of the middle nasal concha and the posterior group cephalic.

Dr. James Bordley, Jr., of Baltimore, expressed his pleasure at being present to see Dr. Schaeffer's demonstration. He thought that it was through such regional studies that clinicians were enabled to accomplish lasting results, since such investigations make us pause in the expounding of theories based on insufficient knowledge and lead us away from false paths in diagnosis. He believed that a word of caution and conservatism at this time was justified, since there was a rather prevalent idea that in dealing with eye disease of doubtful origin the first step should be the obliteration of the paranasal sinuses.

The ocular symptoms in disease of the sinuses may be inflammatory neuritis, retrobulbar neuritis and choked disk, although it must not be inferred that ophthalmoscopic changes are to be discovered in the fundi of every patient with sinusitis. On the contrary, in only a comparatively small proportion of cases do they occur.

Dr. Bordley emphasized the importance of the enlargement of the blind spot of Mariotte in sinus disease, although he was forced to object to the suggestion that enlargement of the blind spot was a constant symptom. In 102 patients with sinusitis, enlargement of the blind spot was discovered but 31 times, and it was found 5 times as frequent in disease of the posterior than the anterior sinuses. In his experience subnormal accommodation was a more frequent symptom of sinus disease.

Dr. Charles P. Grayson said that by his masterly description of the anatomical relations of the optic nerve and tract to the paranasal sinuses, Dr. Schaeffer has done something more than lay the corner-stone upon which we can erect a perfectly clear comprehension of their pathological relations. He has suggested very

impressively how mutually helpful in the matters of diagnosis and treatment the ophthalmologist and the rhinologist can be, and one of the chief reasons for this joint meeting of the two sections is to discuss a certain group of cases in which a little team-work may save not only many an eye but perhaps even many a life. It may be taken for granted that we all know what to do and how to do it when we are certain as to the exact pathological condition that confronts us, but the question arises, How can we be certain? It may be true that the larger number of sinus inflammations, both symptomatically and clinically, are so aggressively obvious that the ophthalmologist will need no assistance whatever in recognizing their existence, and there are many others in which through the history of a more or less severe infective rhinitis, followed by deep-seated intranasal pain or persistent headache at the vertex or perhaps occipital in its location, he will be easily able to make at least a presumptive diagnosis with a great deal of confidence; but there are still others, unfortunately not few in number, in which the rhinologist himself must be deliberate rather than hasty in reaching a diagnosis. In such cases, obscure perhaps because of their smouldering quiescence, there is one fact that will bear a little emphasis, and that is that a merely clinical examination if negative will have very little value. It is no more to be relied upon than is a single negative Wassermann. The failure to discover pus in the middle meatus, the spheno-ethmoidal sulcus or on the posterolateral wall of the pharynx is far from being conclusive evidence as to the health of the sinuses.

Dr. Grayson assumed that in this clinical scrutiny we have relieved any obstruction to drainage from the normal ostia, that we have called upon the law of gravity and have availed ourselves of irrigation when possible and of the rather equivocal suction apparatus in the effort to extract pus from the sinuses, but nevertheless failure to secure it does not complete our examination. Naturally, we next appeal, and with much confidence, to the *x*-ray plate, and yet not always with implicit confidence, for its findings, for several reasons, may be dubious and inconclusive even when its tonal values are interpreted by an expert. In such cases

nothing remains for the conscientiously thorough clinician but to ask permission to make an exploratory opening into the suspected sinus. If this be granted and a sufficient opening made, doubt will vanish.

Dr. Wm. Campbell Posey spoke of some of the less striking but perhaps more common symptoms of sinusitis. He thought asthenopia was often provoked by a chronic inflammation of the conjunctiva, with enlargement of the lymph follicles, occasioned by the spread of the inflammation of the mucous membrane lining the sinuses to that lining the lids. He said that actual testing would often show a diminution in the range of accommodation.

Edema of the lids is one of the most significant symptoms of disease of the accessory sinuses and may often be the means of calling attention to the existence of an inflammation in these cavities, the extreme thinness of the skin of the lids and its loose attachment to the sublying parts causing even a comparatively slight sinusitis to give rise to this condition. The puffiness is usually most marked in the upper lid and particularly on the nasal side, though the entire lid may be swollen. This edema is to be distinguished from the inflammatory swelling and thickness of the lid which results from cellulitis, as it is entirely non-inflammatory in origin as well as in appearance, and also from the ptosis which is at times present as a result of a palsy of the levator of the lid. The swelling is usually most marked in the morning and disappears during the day, but it is also liable to be brought on by bending the head forward. Like all other symptoms of sinusitis the edema may disappear for a time with the discharge of secretion from the sinus, but reappears when the fluid reaccumulates and the congestion of the mucous membrane becomes greater.

Dr. Posey said that while fifteen years ago sinusitis was rarely held responsible for optic nerve disease, there was now a tendency in some quarters to attribute all cases of optic nerve disease for which no other cause could be found to sinus trouble and to operate upon those cavities even though actual evidence that they were in a pathological condition was present. He referred to a recent

communication by Cushing, who called attention to the harm done by such abuses.

In conclusion, Dr. Posey said that he was an advocate of *the orbital incision* in all cases of *orbital* disease from the sinuses, and he believed the association of the rhinologist and ophthalmologist in the performance of such operations most desirable. Closure of the orbital skin incision, after the diseased tissue has been removed from the affected sinus, and free drainage established into the nose by tubes of good size, which should be permitted to remain buried *in situ* until the drainage canals have become well established, should be practised whenever possible.

Dr. George Fetterolf spoke of the difficulties attending the diagnosis of sinus conditions. He took up and discussed, as bearing on this question, anomalies, the usefulness and limitations of translumination and *x*-rays and the inadvisability of making a negative diagnosis on one examination. He stated that vacuum headaches and neuralgias of the sphenopalatine ganglion, as brought out by Sluder, should always enter into the calculation. He expressed the opinion that there should be greater coöperation between the ophthalmologist and the otolaryngologist, emphasizing the importance of having the former examine suspected sinus cases with the idea of noting conditions which were unknown to the patient and which would be of distinct sinus diagnostic value. Dr. Fetterolf further stated that neither he nor anyone else was satisfied with the present status of sinus diagnosis and treatment and hoped for better things through improved *x*-ray technic, a constant thinking by the otolaryngologist in terms of anomalies, by greater intensive study of each case and by closer association of the eye and nose specialists.

Dr. Luther C. Peter said, among many interesting facts which Dr. Schaeffer has demonstrated is one that has impressed itself upon him, namely, that if anyone has preconceived and dogmatic ideas as to the definiteness of symptoms of sinus disease such ideas are open to revision. We all are impressed with the fact,

however, that these cases should be studied from every possible angle.

In an excellent paper read before this section about two years ago by Dr. Ring, he said: "It is a fact that the careful special testing of visual function, and the finding of certain changes in the visual field, may establish a diagnosis before nasal symptoms have been sufficiently marked to attract attention; and, further, it is not infrequent for closed empyemas and mucoceles to give a false sense of security by an almost total absence of nasal symptoms notwithstanding the presence of ocular change." To these well-established facts should be added a third, that visual field changes may be detected before patients complain of a disturbance of vision and before the ophthalmoscope reveals any fundus pathology. These facts form a tripod upon which the claims of ophthalmologists rest in insisting that all sinus cases should be studied from an ophthalmological standpoint, and especially by means of perimetry.

Enlargement of the blind spot in disease of the posterior cells is generally accepted as an almost constant symptom. The exact means by which this is brought about is not nearly so important as the recognition of the fact that it does exist. It means a perineuritis in some part of the nerve, and the proximity of the optic foramen to these cells is most apparent. It probably is the result of continuity of tissues and of toxemia. It is present in acute and chronic disease. It is rarely present in disease of the anterior group. If present in the anterior group it is a late phenomenon, is associated with other field changes, with gross fundus pathology and usually is part of a central scotoma.

Chiasmal anopsias are equally localizing in value. They are more or less infrequent complications and usually signify advanced chronic disease of the posterior ethmoids and sphenoids. Almost any variety of chiasmal anopsias may occur.

Enlarged blind spots and irregular anopsias are definite and localizing. They belong to the posterior cells. Other field changes are not so differentiating in character, but are just as important and perhaps even more than those mentioned in estimating the

amount of damage sustained by the optic nerve. In order to give them their proper interpretation, however, they must be studied in connection with other symptoms, with the appearance of the fundus and especially with those found in the nose. Their chief value lies in determining the degree of damage, and as such they should be a part of every routine examination for sinus disease.

Surgical interference may be indicated by the nasal findings, but surgery should not be practised without proper ophthalmological studies, and visual fields should always be carefully plotted. Statistical studies reported in the literature vary some as to the percentage of cases in which visual field changes are found. Wallis found 100 per cent. of cases involved in disease of the posterior cells and 90 per cent. of total cases. Other writers place the percentage, at least, of the anterior cells lower. Markbreiter found 76 per cent. of the anterior cells had pathological fields. The reasons for these discrepancies are threefold:

1. A limited number of cases, especially of the anterior group, are not accompanied by optic nerve involvement.

2. A large number of cases never reach the oculist for study.

3. Perimetric technic may be faulty. These studies must be painstaking. They cannot be made on a perimeter. They should be made on a tangent screen of a one meter radius.

Inasmuch as the optic nerve is involved in so many cases of disease of the paranasal cells, all cases of sinus disease should be studied from the standpoint of the ophthalmologist as well as from that of the rhinologist. Careful perimetric measurements are a most important part of such studies.

Dr. E. B. Gleason said the picture of the frontal sinus extending far back over the orbit reminded him of one he saw in the dead room that also extended upward nearly to the coronal suture. It occurred in an old man and probably there is a tendency for all the paranasal sinuses to enlarge in old age. The presence of processes from the mucoperiosteum extending into the bone explains why in attempting to extract the mucous membrane from a posterior ethmoid cell or the sphenoid if the orbital wall is thin, bone

will sometimes come away with the mucous membrane as the result of traction.

According to Leon E. White, of Boston, accessory sinus blindness results from (1) direct spreading of the infection to the sheath of the optic nerve, (2) toxemia, (3) hyperplasia.

In chronic cases of infection of the posterior ethmoids and sphenoids there may not be any symptoms for years except postnasal secretion and occasional headaches. Phlebitis of the cavernus sinus, meningitis and brain abscess are rare. The same is true of loss of vision. Blindness may persist for a time, to be followed by spontaneous recovery, although if it persists for several months it may be irremedial. As improved vision sometimes occurs after a discharge of pus it would seem to be often more intimately connected with retained secretions than the infection.

White in the paper referred to above gives a series of cases of blindness in which improvement followed removal of the middle turbinate and opening the sphenoid. The simplicity of his operative measures is noteworthy. In some of his cases there was no marked nasal lesions either by inspection or the *x*-ray—only hyperplasia, which is defined as a "rarefying otitis associated with inflammatory swelling of the mucous membrane lining the accessory sinuses." Jonathan White, quoted in the same paper, states: "It would be difficult to find an adult individual in a temperate or cold climate who does not present an example of this bone change within his nasal chambers." White also quotes MacWhinnie as advocating, in 1910, opening the sphenoid in cases of optic neuritis as a practically harmless procedure. However, having met with fatalities, MacWhinnie soon afterward practically abandoned all operative procedures in suppuration of the paranasal sinuses in favor of treatment by suction. So greatly has the popularity of non-operative treatment of accessory sinus suppuration increased that a recent folder of a prominent New York instrument maker is devoted entirely to suction instruments. Besides suction other methods of treatment have been devised. One recently proposed consists in filling both nasal chambers with normal salt solution and floating out the pus contained in the

sinuses. It is said to have succeeded in cases in which operative measures failed.

Dr. Geo. E. Pfahler said he was sure that every roentgenologist in the room appreciated the brilliant presentation on the accessory sinuses by Dr. Schaeffer.

It was Dr. Pfahler's custom to make at least three postero-anterior views of the sinuses and in this way one gets the outline of the sinuses in the transverse vertical planes and therefore show the lateral and vertical limitations. He then makes two lateral views, either stereoscopically or one from each side, which gives a view of the vertical plane in the longitudinal direction and therefore gives the anterior and the posterior and the upper and the lower borders. He then makes a vertical exposure, which gives the horizontal plane and shows the anterior, the posterior and the lateral borders. By a careful study of these the exact size, outline and position of the accessory sinuses can be shown. Disease produces either an opacity of varying degrees or causes thickening or destruction of the walls of the sinus. One must always keep in mind the value of these transparencies and opacities of shadows in proportion to the size. A small sinus may give no more transparency, though healthy, than a large sinus filled with exudate. Therefore the value of these shadows must be interpreted most carefully. We encounter many technical difficulties, but these are gradually being overcome. In 1912 he described an oblique view of the sphenoid sinuses by means of which technic the sphenoid sinus was projected into the orbital area and by comparison of the two sides additional information can be obtained. We cannot determine, in all instances, the relations of the optic nerve to the accessory sinuses, but in many instances the optic foramen or canal can be shown.

Dr. Pfahler was quite sure that by means of roentgenography the greatest information concerning these sinuses can be obtained, but skill is necessary both in the making of the films and in their interpretation.

DECEMBER 16, 1920

Extensive Choroiditis

Dr. Krauss presented a man, aged twenty-one years, suffering from plastic choroiditis of sudden onset in the left eye. He had clouding of the vitreous, with a large mass of exudate in the choroid, in the upper part of the field. As the exudate absorbed, choroidal changes remained. The cause of this exudative choroiditis was obscure. The Wassermann was found negative, but the von Pirquet reaction was positive. The family history was negative and the patient is a large, robust adult, apparently in the very best of health. Much improvement followed the use of iodide of potassium.

Complete Traumatic Dislocation of Lens

Dr. Krauss presented a man, aged fifty-six years, who was struck by a brickbat on the right malar bone. He developed immediately an intense chemosis of the lids with great proptosis of the eyeball. There was a small laceration of the lower lid near the outer canthus, and large irregular, slightly elevated triangular opacity of the cornea with little inflammatory change. No hemorrhage was apparent in the deep anterior chamber, nor reflection of blood from the deeper chamber, though the vitreous excluded all light. The eye was blind except to the strongest light stimulus.

The *x*-ray showed no fracture of the orbit nor of the surrounding bones.

At present the cornea shows peculiar gray-white punctuate opacities, covering the area occupied by the corneal lesion. The pupil is widely dilated, showing a very narrow rim of the iris.

The anterior chamber is very deep with a black pupil.

Ophthalmoscopically. There are a few fine vitreous opacities. When the patient looks down, in the extreme lower part of the fundus, the edge of the lens can be seen apparently attached to the zonula. When the eye is moved up and down the lens swings toward the center of the vitreous as though attached to a hinge. The eye-ground is well seen. The nerve is gray-white, the arteries extremely contracted, the veins comparatively full. Scattered through the ground, especially in the macular region the choroidal pigment is heaped irregularly, but there is no evidence of rupture. He can count fingers at one foot and has an apparently good light field.

These conditions have suggested a diagnosis of rupture of the ciliary body, complete dislocation of the apparently clear lens, with partial optic atrophy and choroidal changes.

The intensity of the blow was apparently carried into the soft structures of the orbit, without fracture of the bones. An intense orbital hemorrhage and chemosis of the orbital tissues resulted in proptosis. The peculiar opacities in the cornea and the lack of reaction, which the presence of a foreign body in the cornea would bring about, indicated a trophic change. The almost complete blocking of the retinal artery may be secondary to the nerve and retinal changes, rather than any direct effect of the blow. A rupture of the optic nerve would probably have resulted in a greater loss of visual field, and more pronounced atrophy.

Tay-Sachs Disease

Dr. Leighton F. Appleman reported a case of amaurotic family idiocy in a patient aged fifteen months, the firstborn of Hebrew parentage, who appeared to be normal up to six months of age.

After this time the parents noticed that it became dull, apparently losing its sight, muscularly very weak and flabby, and at the present time unable to hold its head up nor to sit up or walk. It cannot move its arms—in fact, it is perfectly relaxed, although apparently well nourished.

Ophthalmoscopic examination reveals both optic disks oval, clearly outlined, but atrophic. Each macular region shows the typical picture of this disease—a white area about twice the diameter of the disk, with a cherry-red spot in the center. The vessels and peripheral portions of the eye-grounds appear normal.

No history of consanguinity of the parents was elicited. Both parents were healthy—no history of lues and no abnormality of the eyes were found in either.

Attention was called to the pathological findings in these cases previously reported and to the etiological factors which have been thought to cause the condition. Treatment is unavailing.

Resection of the Sclera for Detached Retina

Dr. Charles R. Heed exhibited a patient showing the result of a modified Müller operation. The patient had a broad detachment, practically the entire temporal retina, for one month previous to the operation. There was complete absence of the nasal field (hemianopsia), with eccentric vision of 6/LX. Five weeks following the operation, field for 10 mm., white and red were normal and central vision equalled 6/XXl part. The ophthalmoscopic picture of the retina disclosed little or no displacement, except at the site of scleral section, where a moderate elevation of the retina was noted.

Dr. Hansell said that any treatment, medicinal or operative, that can effect cure in retinal detachment is worthy of consideration and trial. Dr. Vail, in the November *Archives of Ophthalmology,* contributes a thoughtful article concerning the etiology. He suggests that in most cases, if not in all, of idiopathic detachment that the secretory glands of the ciliary body have ceased to functionate. Hence the aqueous humor becomes more and more reduced in quantity and the relation between the pressure in the posterior part of the globe and the anterior becomes changed. The withdrawal of normal tension causes passive hyperemia of the tunica vasculosa. This allows diapedesis and transudation. He

says that the usual operative measures do not cure more than one out of 1000 cases. The next article, by Edgar S. Thompson, tells of 7 cases out of 75 cured by trephining the sclera and immediate aspiration. Müller's operation is designed particularly for detachment in high myopia. Dr. Heed is to be congratulated on his skill and attention to minute details in the performance of the operation on his patient and in the satisfactory result. The procedure must appeal to us as worthy of trial in all cases in which the sclera is too large for the ocular contents.

A Case of Coralliform Cataract

Dr. William Zentmayer exhibited a patient who was brought because her vision was too poor for her to continue her studies. She was an Italian child, aged seven years, who had in each lens a typical coralliform opacity. By oblique illumination parts of this opacity were seen to be distinctly crystalline. Vision: right eye = 5/60; left eye = 5/20. Corrected vision: right eye, 5/20; left eye, 5/15. This hereditary type of cataract was until recently supposed to be due to a fault in the development of the lens, but recently Verhoeff has had the opportunity of examining a lens presenting this type and found the opacity to be made up of crystals. Thorough chemical and microscopic examination failed to determine their nature. Verhoeff assumed them to be protein, being probably derived from myelin, which he found to be normally present in an infantile lens examined by him. He supposed the crystals to result from this substance through deficient calcium metabolism. Some question had arisen as to whether the case presented should be operated on at the present time. From the vision, as determined scientifically, operation may seem uncalled for, but since the child cannot continue with its studies, operation would seem defensible.

Dr. Posey advised needling the eye with poorest vision, without making any effort to recover the crystals. After the successful completion of that operation and the assurance of good vision in

one eye, he thought Dr. Zentmayer might risk the removal of the remaining lens *in toto* for the purpose of obtaining the crystals for analysis.

Dr. McCluney Radcliffe advocated the more radical operation of removal of the lens in its capsule, in order to prevent the danger of some of the crystals dropping into the anterior chamber and setting up a persistent irritation. He stated that the operation should be done under complete general anesthesia, using either the Noyes or the Ziegler loop to remove the lens. When done in that way, he considered it a perfectly safe operation, as he had frequently employed it without the slightest loss of vitreous.

A Case of Locomotion Pulse

Dr. Zentmayer showed a man, aged twenty-four years, suffering from aortic regurgitation. He came to Wills Eye Hospital because of the developing of proptosis of the right eye. Locomotion pulse involving the entire arterial retinal tree was present in the right eye.

A Case of Pernicious Anemia

Dr. Zentmayer presented a man, aged thirty-one years, in whom a diagnosis of pernicious anemia had previously been made and was confirmed by Dr. Musser. The changes in the eyes were not typical. Both fundi were rather pale and there was a low-grade neuroretinitis in the left eye and a marked pallor of the optic nerve head in the right eye. The contrast between the artery and the vein was not as pronounced as in normal eyes. In the extreme periphery of the right eye there was the remnant of a small hemorrhage apparently from thrombosis of a venule.

A Case of Diabetic Retinitis

Dr. Zentmayer showed a man, aged fifty years, who came because of smoky vision, which had begun three months ago. He considered himself in perfect health. In both eyes the retinal exudation was of the massive type. In the left eye the saccular exudation was surrounded by a zone of hemorrhages and on either side of almost all arteries there was a broad white strip about one-half disk diameter in width. In the right eye the changes were similar, but not so pronounced. The right temporal vein was thrombosed. The urine contained a high percentage of sugar.

Wound of the Orbit

Dr. Wm. Campbell Posey exhibited a case of gunshot wound of the head involving the orbit. The bullet of a 38-caliber revolver fired at very close range struck the subject, a young colored woman, midway between the eyes, and entering the head through the nasal bone was split into two large fragments and a number of smaller ones either by the bone or by the quite heavy gold-filled bridge of a pair of spectacles, which fortunately were worn at the time of the accident. Scarcely stunned by the shot the patient walked several squares to the Howard Hospital, where the left eye was found to be somewhat proptosed and diverged and almost blind. The right eye was unaffected. The fragments of shot revealed by the *x*-ray were all in close association with the sphenoid bone. The large fragment on the right side fortunately stopped just short of this cavity and was lodged in the posterior ethmoidal cells; the fragment upon the left side had apparently fractured the inner wall of the orbit and injured the optic nerve in the foramen, the nerve showing later the characteristic signs ophthalmoscopically of optic atrophy and vision being reduced to hand movements. Several of the smaller fragments had been removed by the rhinologist to the hospital, but the two large

fragments just referred to were permitted to remain *in situ*. The external wound healed rapidly and at no time were there constitutional or local symptoms with the exception of those referred to.

Eye Symptoms in a Case of Obscure Brain Disease

Dr. Howard F. Hansell reported the case of a boy of nine years suffering from attacks of intense headache, projectile vomiting and delirium lasting several hours.

The ocular symptoms on admission consisted of unequal pupils only slightly contracting to light; double choked disk; star-shaped, bright, glistening figures in foveal regions three or four times the size of the disk; retinal hemorrhages; complete left hemianopsia: nystagmus on forced rotation. V = R. 6/60. L., hand movements.

The symptoms of disease of the cerebrospinal nervous system on admission were slight weakness of the left arm and leg; no inequality of the face; slight incoördination of the left arm; distinct asynergia of the left leg; the reflexes were normal and there was no loss of sensibility. The neurologist detected hemianopic pupillary reaction. *X*-ray, urinalysis, blood, nose and accessory sinuses negative.

The conclusion drawn from the complete Bárány test was that "the lesion appears to be in the upper half of the pons on the right side, not involving the posterior longitudinal bundle, and below the floor of the fourth ventricle.

The boy's faculties have deteriorated during the several months of observation. He has lost weight, mentality, equilibrium and muscular power.

The ocular complications comprise all of those commonly associated with brain tumor and by their very variety and number excludes the possibility of localizing value. They point to a gross lesion involving the pons, the cerebellum, the optic tracts and the primary optic centers. It is only by assuming that the lesion is extensive that there has been an increase of intracranial fluid

which would naturally be associated with it that the symptom may be explained. Dr. Dercum believes that the neoplasm developed first in the cerebellum, especially in the right side, and extended forward to involve the corpora quadrigemina. Death ensued October, 1920, eleven months after the first symptoms appeared.

J. Milton Griscom, M.D.,
Clerk.

PROCEEDINGS

OF THE

SECTION ON OTOLOGY AND LARYNGOLOGY

REPORT OF THE SECRETARY OF THE SECTION OF OTOLOGY AND LARYNGOLOGY

Officers of the Section were: Chairman—Dr. E. B. Gleason. Clerk—Dr. N. P. Stauffer.

Members, 25 Meetings, 8. Average attendance—Members, $9\frac{3}{8}$; guests, $89\frac{3}{4}$.

We have had the largest attended meetings by the medical profession of Philadelphia, in the history of the Section, the most popular being the clinical nights and one with the Ophthalmological Section, when over one hundred and fifty physicians were present on each occasion.

During the year we have entertained: Surgeon-General Lister (Washington), Dr. Jas. Bordley, Jr. (Baltimore), Dr. E. L. Fish (China), Dr. J. C. Beck (Chicago), University of Illinois.

The programs were as follows:

List of Papers

Stated Meeting, Wednesday Evening, January 21, 1920

Regular election of Officers of the Section.

Experience Meeting: Unusual cases by all members of the Section.

Stated Meeting, Wednesday Evening, February 18, 1920

Dr. Jos. C. Beck, Professor of Rhinology, Otology and Laryngology of the College of Illinois (by invitation): "Further Report on the Use of Radium and Other Non-surgical Measures in Malignant Disease of the Head and Neck."

Dr. George E. Pfahler, Professor of Roentgenology of the Post-Graduate School of Medicine of the University of Pennsylvania, opened the discussion.

Dr. Wood exhibited a patient with papilloma of the vocal cords.

Dr. Lewis exhibited a patient with tracheotomy for tuberculous laryngeal stenosis, who has a positive spinal Wassermann and negative blood Wassermann.

Dr. Gleason exhibited a patient with a radical mastoid and an exostosis of the external canal.

Dr. Stauffer exhibited a patient with a frontal and maxillary sinusitis and one with a recurring osteochondroma of the external and internal nares and hard palate which radium did not affect.

Dr. G. M. Marshall exhibited a patient with mastoiditis and postoperative paralysis of external rectus.

Stated Meeting, Wednesday Evening, April 21, 1920

Dr. C. P. Brown will give an address on hay fever (by invitation).

Dr. J. A. Kolmer will open the discussion.

Regular Meeting, May 19, 1920—*Demonstration Night*

Dr. C. C. Eves: Transillumination of nasal sinuses. Demonstration.

Dr. N. P. Stauffer: Puncture of maxillary antrum. Demonstration.

Dr. E. B. Gleason: Suction treatment of nasal sinuses. Demonstration.

Dr. F. O. Lewis: Direct examination of the larynx by Jackson's laryngoscope. Demonstration.

Dr. G. B. Wood: Indirect method of cauterization of the larynx. Demonstration.

Dr. B. A. Randall: Tuning-fork tests and Bárány reactions. Demonstration.

Regular Meeting, Wednesday Evening, October 20, 1920

Dr. E. B. Gleason: "Supernumerary Tooth Removed from Nasal Septum during Submucous Resection.

Drs. C. C. Eves and Watson: "Carcinoma of the Larynx." (Exhibition of patient.)

Dr. N. P. Stauffer: "Transplantation of Tibia for Nasal Deformity." (Exhibition of patient.)

Dr. F. O. Lewis: "Thyroidotomy for Malignancy of the Larynx." (Exhibition of patient.)

Dr. G. B. Wood: "Report of Atypical Frontal Sinus Case.

Dr. C. P. Grayson: "Malignant Diseases of the Pharynx and Larynx Treated by Radium." (Exhibition of patient.)

Combined Meeting, Thursday Evening, November 18, 1920

Professor J. P. Schaeffer, Professor of Anatomy, Jefferson Medical College: "Anatomic Relations of the Optic Nerve and the Optic Commissure to the Paranasal Sinuses." (Lantern demonstration.)

The discussion will be opened by Dr. J. Bordley, of Baltimore (by invitation); Dr. C. P. Grayson, University of Pennsylvania; Dr. George Fetterolf, University of Pennsylvania; Dr. W. C. Posey, University of Pennsylvania.

NATHAN P. STAUFFER,
Clerk.

PROCEEDINGS

OF THE

SECTION ON GENERAL MEDICINE

DECEMBER, 1919, TO NOVEMBER, 1920

The Clerk of the Section respectfully submits the following report in accordance with the By-laws of the College:

The Section has had a prosperous year under the leadership of Dr. Clifford B. Farr, elected Chairman, January 24, 1916, and Dr. J. M. Anders, elected Chairman January 26, 1920.

The Executive Committee of the Section, appointed by the President of the College for the year 1920, were Dr. David Reisman, Dr. M. Howard Fussell and Dr. Clifford B. Farr.

The Section has an active membership of but 71 Fellows, and the Executive Committee feel that a much larger number of the Fellows of the College should become active members of the Section.

During the past year seven stated meetings have been held, and one very successful joint meeting with the Pathological Society of Philadelphia. At this latter meeting Dr. W. W. Herrick, of New York City, presented the subject of the epidemic form of cerebrospinal meningitis.

A special attempt has been made during the year to welcome senior medical students, interns and service men who are in Philadelphia for temporary duty.

The average attendance at the meetings has been gratifying. We have averaged 21 Fellows and 122 guests at each meeting.

E. J. G. Beardsley,
Clerk.

List of Papers

December, 1919

Dr. J. A. Lichty, of Pittsburg, Pa.: "Treatment of Thyroid and Other Endocrin Disturbances."

January, 1920

Dr. T. G. Schnabel and Dr. Arthur H. Gerhard: "A Case of Diabetes Insipidus."

Dr. B. B. Vincent Lyon: "The Medical Treatment of Cholecystitis and Choledochitis."

March, 1920

Dr. H. W. Rhein: "Encephalitis Lethargica."

Dr. David Riesman and Dr. Charles Goss: "Encephalitis of the Non-lethargic Type."

April, 1920

JOINT MEETING WITH THE PHILADELPHIA PATHOLOGICAL SOCIETY

Dr. W. W. Herrick, of New York City, Dr. Paul Lewis and Dr. Herbert Fox: "Epidemic Cerebrospinal Meningitis."

April, 1920

Dr. Bernard S. Oppenheimer: "Cardiac Arrhythmias."

May, 1920

Dr. R. J. Kline and Dr. Eiman: "A Case of Leather-bottle Stomach." Exhibition of Specimen.

Dr. Alfred Gordon: "A Case of Hodgkin's Disease, with Involvement of the Cord."

Dr. C. B. Farr: "A Case of Syphilis of the Stomach."

Dr. George Wilson: "Practical Phases of Neurological Diagnosis."

Dr. P. G. Hamlin: "Chronic Gout."

Dr. A. A. Pless: "Mastitis following Typhoid Fever."

Dr. Jane Sands and Dr. R. C. Hunsberger: "Venous Thrombosis as a Sequel to Pneumonia."

October, 1920

Dr. Joseph Victor Klauder: "Syphilitic Backache."

Dr. Meyer Solis-Cohen, Dr. George D. Heist and Dr. Leon Solis-Cohen: "A Case of Mikulicz Disease."

Dr. Elmer H. Funk and Dr. Edward Weiss: "A Case of Severe Mercuric Chloride Poisoning, with Recovery."

Dr. Edward Weiss: "Aneurysm of the Hepatic Artery."

Dr. Ward Brinton: "A Few Days with the Rockefeller Yellow-fever Commission in Guatemala."

November, 1920

Dr. L. F. Barker, of Baltimore: "Comments on the Classical Endocrine Syndromes."

PROCEEDINGS

OF THE

SECTION ON INDUSTRIAL MEDICINE AND PUBLIC HEALTH

DECEMBER, 1919, TO DECEMBER, 1920

DECEMBER 17

Occupation in Relation to Heart Disease

BY WM. EGBERT ROBERTSON, M.D.

"It is when we come to study the causes of diseases that we are most disconcerted by the breadth and depth of our ignorance; it is here that our path is most cumbered with guesses, presumptions and conjectures, the untimely and sterile fruitage of minds which cannot bear to wait for the facts, and are ready to forget that the use of hypothesis lies not in the display of ingenuity, but in the labor of verification. Again and again the data required are not before us, or not fully before us; indeed, even so far as we have them it may be impossible to track them severally through the perplexities of individual lives." This I have quoted at length from Clifford Allbutt,[1] for it expresses so aptly the position in which I find myself. In an attempt to obtain some data bearing upon the relation between occupation and diseases of the cardio-vascular system I wrote to many of the larger insurance companies, both industrial and old line, but their medical departments reported

[1] Diseases of the Arteries, including Angina Pectoris, 1915, i, 154.

almost uniformly that no classified statistical information is available. The Metropolitan Life Insurance Company of New York published a work this year entitled *Mortality Statistics of Insured Wage Earners and Their Families.* From this I shall quote later, as it seems the only data at hand at this time which has been classified and made available to the medical profession by any of the insurance companies. I next bethought me of the various industrial organizations. Here, too, I was doomed to disappointment. From the insurance companies I had hoped to obtain mortality statistics bearing upon cases of hypertension, cardiac hypertrophy, vascular sclerosis, renal disease, possibly grouped according to blood-pressure observations, perhaps throwing some further light upon the decrescent type of vascular degeneration so insistently brought to our notice by Clifford Allbutt. From an industrial source I felt justified in hoping for some data of a more or less definite, clinical character. Even allowing for the newness of work of this character in this country, its intensely human interest would seem to make it a fruitful field. My utter failure to obtain information from this source may be variously interpreted. Lack of systematic records was generally admitted, while others stated that the examinations made were not exhaustive. Blood-pressure observations were rarely made and there seemed no tendency to group studies according to character of occupation. Surely this work merits very careful attention, not alone for its human interest, but as a rich field of promise in the direction of vast statistical data. Not alone are the interests of the employee involved in a study of this kind, but in view of the compensation laws now in existence in the various states of the union the employers' interests are equally involved. Granting this, it is a serious stricture upon the common-sense and even the integrity of many employers of labor, and, further, an unconscious admission on the part of the so-called capitalistic class of their utter disregard of the welfare of those whose labor supports them, when their medical staff is selected less from the standpoint of efficiency than economy, and men are chosen who have not, for various reasons, been admitted to practice in the state, and others, chosen as aids, are frequently

wholly innocent of any knowledge of medicine, and could not be expected, therefore, to manifest any interest in a detailed study of cases or the preparation of statistical data. I do not wish to be understood as hurling diatribes at the system. The plan is splendid in its conception, but unfortunately too often faulty in execution. This need not be so, for in the last analysis the burden of expense is borne by the consumer.

My next move was an attempt to determine the influence of effort upon the heart and vessels of those apparently in good health, and very naturally I turned to the departments of physical education in many of our larger universities and colleges and to the medical staff and athletic instructors. Even here I learned that in most institutions no intensive use is made of the opportunities presented, often no data is extant, even the routine physical examination being more or less perfunctory. Those who by virtue of skill and strength become members of competing teams apparently receive more study, but not uniformly. One professor of physical education stated: "I have, of course, made many observations on the heart action of athletes, but I have never followed any one particular person through the entire period of training, and have really no information of value upon this subject." Joseph E. Raycroft,[1] associated with Princeton University, replied as follows: "Such information as we have with reference to the influence of exercise upon the heart is so incomplete that I should prefer not giving it out." He adds, however, that: "At a later date it will be published." Another states: "I have not been greatly impressed with work done on this subject to date, because it seems to me as if every man who has made investigations that have come to my attention has dealt with the subject in too limited a way. The line between stimulating useful exercise and overexertion that results in strain is one that varies not only with different individuals at different ages, but also in each individual at different periods and different times. I am certain that in too many cases youngsters in high schools or secondary schools

[1] Personal communication.

are stimulated during one of the periods of most rapid growth to overindulge in athletic competitions of one sort ot another, with the result that they come up to the university showing signs of damage which is more or less serious, but from which, fortunately, most of them make a complete recovery after the lapse of months." In this statement I believe we can all concur. During the formative period of a child's life careful supervision should be exercised so that the food values may be expressed in growth and nutrition rather than be dissipated in excessive energy. By such a plan I believe we could defend many against the later development of tuberculosis, for relatively deficient food values probably play a larger part than heredity in inviting an active tuberculosis in later life.

The value of the study of athletics in its possible bearing upon the cardiovascular system, in contrast with the effort attendant upon various occupations, lies in the fact that the student is carefree and not subject to psychic forces, the mental and physical strains of a daily routine incident to procuring a livelihood or amassing a competence. Seldom does the daily worker get a measure of joy out of his occupation at all comparable with the keen delight with which the athlete throws himself into his training and competitive sports. If to this is added the thrill that comes with success no hardship in preparation is deemed too great a handicap. James MacKenzie[1] says: "Bodily effort is not the only cause of exhaustion; in many people an irritable mechanism playing upon the heart induces a reaction that is peculiarly exhausting. In many sensitive, nervous people the readiness with which the heart responds to stimulation constitutes the real source of trouble and in time leads to very marked exhaustion, especially if the heart is affected by some organic lesion. Worry, business or domestic, plays an important part in depressing the heart's functions."[2] These factors rarely apply to those whose years still find them in school or college, especially when we take cognizance of the tremendous amount of cardiac reserve possessed in youth. *A priori*,

[1] Mackenzie, Sir James: Diseases of the Heart, 1913, 3d edition, p. 359.
[2] Ibid., p. 359.

therefore, we should not expect athletic exercise at that time of life to result in harm. MacKenzie doubts the existence, as a pathological entity, of the so-called "athletic heart." He refers to it as an "unfortunate bogey."

Dr. R. Tait McKenzie,[1] professor of physical education at the University of Pennsylvania, in an article on "The Influence of Exercise on the Heart," divides athletic exercise into: "Movements in which a maximum effort or short series of efforts predominate, such as shot-putting, weight-lifting, heavy gymnastics and sprinting, and movements of endurance in which the single effort is slight, but the series prolonged to exhaustion, like walking, cross-country running and cycling. Exercises of effort produce a sudden and rapid rise in blood-pressure to 200 mm. and more, which rapidly falls when the effort is over, the pulse returning quickly to its normal rate. The resilience of the heart and arterial system is tested by such exercises and they should be avoided by those of advancing years. Exercises of endurance show a slower rise in pulse-rates and the blood-pressure never rises to a great height; but even after the pulse has returned to its normal rate the pressure remains high, returning slowly to normal." As McKenzie states, it is in boat-racing that these two forms of exercise are combined in high degree. Yet Dr. Roger I. Lee,[2] professor of hygiene at Harvard University, in "A Study of the Effect of Rowing on the Heart," made conjointly with Dr. W. J. Dodd and Dr. E. L. Young, using all of the approved methods of study, *x*-ray, fluoroscope, physical examination and the electrocardiograph, failed to find any appreciable enlargement of the heart in men who had been rowing from two to four years, or even over ten years in some instances. In some they detected functional murmurs, but no arrhythmia, no blood-pressure which could be interpreted as abnormal and no albumin or sugar in the urine.

Tait McKenzie[3] heard functional murmurs in 74 of 226 men examined after fifty steps of "stationary running," 27.8 per cent.

[1] Am. Jour. Med. Sc., January, 1913, cxlv, 69.
[2] Boston Med. and Surg. Jour., September 30, 1915, No. 14, clxxiii, 499.
[3] Am. Jour. Med. Sc., January, 1913.

They were more frequent in the recumbent posture, and when heard in other postures were increased by recumbency. He considers it a demonstrated fact that: "Even severe athletic competition does not, as a rule, appreciably damage the circulatory apparatus, and its role in hastening the onset of arteriosclerosis is still difficult to determine. Certainly, it is not to athletics, but to the much more strenuous occupations continued throughout long hours and under unsanitary conditions, as coal-mining and iron-working, that one must look for information on this subject."

Dr. Lee[1] has given some interesting facts resulting from a study of 662 freshmen at Harvard, of an average of eighteen years. Blood-pressure observations were made in standing and recumbent positions, and routine urine examinations were made. The average systolic and diastolic pressures were approximately 120 mm. and 80 mm. respectively. Eighty-five, or 12.8 per cent. of the total 662 had systolic readings over 140. There were 7 with systolic readings over 160 and one of 180 mm. Of the hypertension cases restudied many later became normal. The most interesting statement made is that 22 cases with an abnormal blood-pressure reading presented other lesions while in 52 cases no other lesions were found. We can only speculate on the proportion of this latter group, which are essentially cases of hyperpiesia.

Clifford Allbutt[2] concludes a study on "Overstress of the Heart" with the following words: "The importance of muscular effort as a factor in cardiac injury has been much exaggerated. In the sound adult organism the effects of physical stress upon the heart are promptly counteracted by equilibrating machinery, and especially by large expansion of muscular and pulmonary areas." The danger lies not to the physically fit, but especially to those who, after a period of laxity more or less prolonged, suddenly essay the effort of former years. Prompt fatalities occasionally ensue, or a degree of cardiac strain may result which progresses to definite decompensation after a period of relative invalidism. To the employer of labor, however, one phase of effort in the youth is peculiarly

[1] Boston Med. and Surg. Jour., October 7, 1915, No. 15, clxxiii, 541.
[2] Allbutt and Rolleston: System of Medicine, vi, 193, 251.

impressive. In the presence of any infection, mild or severe, and particularly in febrile states, strain is badly borne. Allbutt[1] cites a case of a youth, aged seventeen years, not in training nor in perfect health, who developed acute dilatation of the heart in consequence of a mountain-climb. He became prostrate and livid; cold extremities; pulse 136 to 140, but regular; temperature, 102.° A small patch of impaired resonance was later discovered, with some bronchial crepitation, in the middle third of the right lung posteriorly. Several weeks were necessary for his recovery, and the opinion is expressed that a neglected cold was indirectly responsible for the heart-failure, the effort, even in a lad under such conditions, being sufficient to cause the already weakened heart to yield. It must be apparent at once that those engaged in heavy labor should be prevented from making effort in the presence of mild infections, and after recovery from a more prolonged illness, arduous effort is not justifiable until such measures as we possess have been employed to determine the fitness of the employee to resume his customary occupation. All observers agree that in the physically fit the blood-pressure range is low. Even in the normal worker whose labor is arduous, after a brief rest the blood-pressure is apt to be within normal limits. In his own person, Allbutt states: "A few weeks of mountain-climbing or a cycling tour are always followed by a lower range of blood-pressure lasting for many weeks. I have not considered the valvular heart lesions in this cursory review of the relation between occupation and heart disease. They are so definitely the result of infection, rheumatic or syphilitic, rarely congenital, due to intrauterine infection, that the only manner in which occupation could play a part would be by decompensating the cardiac muscle by overeffort, relative or absolute, or by some toxic factor, metallic or gaseous. Of course, it is conceivable that an accidental infection may be contracted in the performance of one's work, as in the syphilis of glass-blowers, or even those using wind instruments, or possibly a wound infection with streptococci; but one would

[1] Allbutt and Rolleston: System of Medicine, vi, p. 196.

not be justified in looking upon the occupation under such conditions as one necessarily predisposing to heart disease. Knowing the intimate relationship that exists between the heart muscle, the arteries and the kidneys the problem with which we have to deal is to determine whether work, *i. e.*, mental or physical strain incident to one's occupation, may cause a weakening in the defensive mechanism of any one of the three links named or whether any particular occupation may in itself cause actual disease of any or all of these structures. We have seen that work alone, expressed in terms of severe physical effort, is not responsible for any morbid change in the young and physically fit, nor can it be said to have even in later life in one who has lived wholesomely and continued to exercise for the very joy of exercise or because it is in the nature of his daily routine. Nor can we directly incriminate the occupation as a provocative factor in those cases to which so much attention has been attracted during the period of the recent World War. In England, called by Thomas Lewis "effort syndrome," and in this country designated as "neurocirculatory asthenia," we deal with a group in which instability of the vasomotor apparatus is the dominant feature, a condition in which there is usually a decided fall in the systolic blood-pressure in the erect posture compared with the systolic pressure in recumbency. It is unnecessary to detail the symptoms. The condition manifests itself under effort or even under mental strain or is exaggerated by such factos. It is most common in those who have led sedentary lives, in the hyperactive thyroid group, in the incipiently tuberculous individual, in visceroptotics and in those whose custom it has been to use alcohol rather freely. It may develop, too, after an infectious disease, but in this case complete recovery is the rule with the progress of time. Occupation, therefore, may "uncover cases of this character," but its relation is only indirect. It must be admitted, however, that severe strain may jeopardize the future health of the unfortunates who belong to this group. It is not possible for us in the haze which at present clouds our horizon to obtain a sharp and clear-cut view of the relations between particular occupations and cardiac disease. We

cannot be pontifical. In a limited sense it is permissible to draw some conclusions, but by whatever avenue the topic is approached we are confronted by the fact that in most instances the arteries and kidneys must be included in the review. Toxic agents may give rise to syncope or to disturbed rate or rhythm, but no factor is more likely to cause bradycardia than syphilis, but is also caused by carbon monoxide, sulphurated hydrogen and hydro-organic acid. Metallic poisons as we meet with their effects in the arts and crafts may give rise to cardiac hypertrophy, but only after the production of vascular lesions with renal involvement. Of course, there are many who have more or less myocardial deficiency, with or without valvulitis, and doubtless vast numbers with well-compensated hearts in the presence of a valvulitis, acquired wholly apart from their occupation, but in whom the nature of their work may be a factor. Considering, then, for a moment the vascular-renal complex the thought occurred to me that it might be well to try to ascertain the type of lesions presented by the lower animals and by the insane. While work hypertrophy and associated vascular lesions may occur in wild and domestic animals, it seemed unlikely that they would be met with in the insane, and in neither would the psychic factor play a part as it does in normal life in the human. The involutional or decrescent or degenerative type of vascular lesion, as met with late in life, is not to be considered in this connection. This aside, then, very little real help is afforded us. Very little seems to have been written on the subject of arterial disease in the lower animals. We all recall the findings of Charcot in horses, the atheroma of the abdominal aorta and the vessels of the legs. Parisot, too, states that atheroma is not rare in the arteries of wild and domestic animals. Dr. Herbert Fox, in a personal communication, tells me that he has been interested in this subject for several years, and as a result of his observations in animals at the Zoölogical Garden in Philadelphia he finds that wild animals suffer from productive angeitis more than the strictly degenerative type as we see it in the human. It is not usually associated with cardiac hypertrophy, nor is there apparently any individual or peculiar form. Renal

disease is a common condition in animals, usually the degenerative type, although some cases of chronic infective nephritis have been seen. Dr. W. J. Crocker, of the veterinary school of the University of Pennsylvania, informs me that in race and work horses cardiac hypertrophy frequently occurs with a chronic, verrucous and calcified endaortitis with resulting stenosis and later myocardial degeneration and broken compensation. Kitt,[1] too, states that patches of sclerosis occur in the arch, sinuses and valves of the aorta in old horses, and that to the unaided eye they present the same character as lesions met with in these regions in the human. Dr. Crocker also says that in practically all dogs over one year of age a chronic interstitial nephritis develops, with hypertrophy of the heart and aortic wall, chronic mitral valvulitis and insufficiency and in time all of the progressive evidences of broken compensation. So it would seem that the simple life and possible overfeeding are as potent as overwork in the production of vascular and cardiac disease in domestic animals at least. Certain it is that neither alcohol nor tobacco play a part in the lower animals, and I am just as convinced that proof is lacking that these latter agents play any great part in causing vascular disease in the human, though it is not possible for me within the limits of this paper to present the evidence in hand. Suffice it to say that I have found that two ounces of whisky cause a transitory rise in systolic blood-pressure in about ten to fifteen minutes, with a prompt fall below the previous normal to the individual. Capsicum suspended in water also causes a primary rise, but no subsequent fall. The rise in both instances is doubtless due to a reflex vasoconstriction of the splanchnic area by way of the afferent fibers from the mucosa of the stomach. Alcohol acts like a nitrite, for intravenous injections cause a prompt fall in blood-pressure without a primary rise. A rather large necropsy experience led me to the above expressed view concerning alcohol. Workers in the tobacco industry show no undue tendency to sclerosis of the vessels. Cigarette-smoking is as common among Gentiles as it is among Jews, yet in the former we very rarely meet with thrombo-angeitis obliterans

[1] Lehrbuch path. Anat. d. Hausthiere.

(Bürger's disease). According to Dr. Mott apoplexy in the insane is relatively infrequent. The insane rarely manifest cardiac hypertrophy, for high arterial pressure is so exceptional among them. They do develop the decrescent type of arterial degeneration, but nothing comparable with hyperpiesia. Dr. Paul Weston, pathologist to the State Hospital at Warren, tells me that arteriosclerosis and cardiac hypertrophy are rare in the insane. Incidentally, he says that it is not because an individual is a lunatic that he does not develop these conditions, but because he has been confined for years with his diet controlled. My own belief is that heredity is one of the strongest determinants in vascular degeneration, but not necessarily with hypertension. It is a common experience to meet with individuals whose palpable arteries are thickened and tortuous, but whose systolic pressure is frequently not above 150 mm. This is often the case after sixty to seventy years of age, and in such individuals, too, there is very little cardiac hypertrophy. This is often a family tendency, apoplexy or renal incompetency terminating the scene. In another group the members of which are younger, rarely in their teens, more often in their late thirties or in the forties, heredity may play some part, but it is in these, too, that we seek some toxic factor, not rarely in connection with their occupation. These are the typical hyperpietics in whom the sole finding for months or even for several years is vascular hypertension. Kober and Hansen[1] cite arterial strain due to prolonged effort or severe, intermittent physical effort or mental worry as the causes of arteriosclerosis. They also ascribe it to intestinal toxemia and some of the metallic poisons, notably lead. They regard it as being very common among stevedores, iron- and steel-workers, smiths, butchers and soap-boilers, painters and others exposed to chronic poisoning by heavy metals. Primary cardiac overstrain, they state, is frequent among soldiers, porters, miners, blacksmiths and metal-workers.

Quoting Milton Rosenau:[2] "Industrial hygiene is one of the most

[1] Diseases of Occupation and Vocational Hygiene.
[2] Preventive Medicine and Hygiene, 1917, 3d edition.

important topics in preventive medicine, as it deals with the health, the welfare and the human rights of the vast majority of the population." . . . "The questions of industrial hygiene strike at the very root of our social system; they include the relation of capital and labor and the relation of man to his fellow-men." He points out that "the employee must largely accept the conditions as he finds them and is frequently denied many advantages, even necessities." He therefore needs legislative aid in combating the "unreasonable demands which capital has ever exacted of labor." He states that we are far behind England and continental countries in this regard. Paid factory inspectors antedated medical officers of health in England as a result of the Act of 1833 to secure healthy conditions of work. Rosenau cites as an instance of our shortcomings the findings of Dr. Alice Hamilton, who "discovered 25 cases of lead-poisoning during one year in a 'model' Illinois factory employing 200 hands, while large English white-lead works under careful supervision frequently show not a case of lead-poisoning for several successive years." It is to the physicians engaged in industrial medicine that we will have to look ultimately for the data relating to industrial hygiene, and especially occupation diseases. Until they fully realize their vast opportunities and moral obligations, and until well-qualified men accept these responsibilities, we cannot hope for a great deal from this source. Dr. G. Morton Illman, medical director of the Zurich General Accident and Liability Insurance Company, Limited, tells me that he finds great difficulty in gathering data on many questions concerning industrial medicine, and says that in view of the importance of the subject "it is one that has been sadly neglected by our profession at large."

The only other source of information must come from census reports and from the great mass of material in the hands of the large life insurance companies. I am indebted to Dr. Harry Toulmin, medical director of the Penn Mutual Life Insurance Company, for some valuable references, and to the Metropolitan Life Insurance Company indirectly for their *Mortality Statistics of Insured Wage-earners and Their Families*, also to the pains-

taking work of Mr. R. F. Edwards, chief clerk of the Prudential Life Insurance Company.

Organic diseases of the heart are second in numerical importance to tuberculosis in the mortality of insured wage-earners according to the report of the Metropolitan Life Insurance Company. In the mortality statistics as given by the Census Bureau for the years 1915 to 1917 inclusive the numerical rank took first place. These rather surprising mortality rates are of special interest in their suggestiveness. Mental shock and worry are well-known causes of cardiovascular disease, and it seems likely that the many strains incident to the World War have been responsible for the greater death-rate from the group of disease entities included under the designation "Organic Diseases of the Heart" during the past few years. From 1911 to 1916 there were 75,345 deaths from organic heart disease among the industrial policy-holders of the Metropolitan Life Insurance Company, or 11.9 per cent of the 635,449 deaths from all causes, a rate of 140.1 per 100,000 exposed. As in the registration area of the United States the Metropolitan also found the mortality rate higher among the colored than among the white race. As to sex, with scarcely an exception, the rates for females are higher than for males up to and including the period from twenty to twenty-four years. After this the death-rate among males is uniformly higher, especially among white people. This is of special importance, for this cardiovascular group is thus seen to exact the greater toll among adult males, the chief or perhaps the sole wage-earner in the family, after a period more or less prolonged of unproductiveness due to ill-health. Another point of interest was brought out by the statistics of the Metropolitan Company. They found that with the exception of the age period under four years there is a much higher death-rate for the group of insured working-people than among the general population, especially during the most active age periods of life. Again in the age period of twenty-five to forty-five the death-rate is higher for males than for females among the wage-earners. This is not the case as found among the death-rate of the entire population in the registration area.

Organic Diseases of the Heart

(From Mortality Statistics, 6 A, 1917, College of Physicians).

The number of deaths from organic diseases of the heart in 1917 is 115,337, corresponding to a rate of 153.2 per 100,000 population and constituting 10.8 per cent of the deaths from all causes. More deaths are reported as due to organic heart diseases in 1917, 1916 and 1915 than to tuberculosis (all forms), which previously held first place among causes of death.

In making comparisons it must not be forgotten that nearly all persons who die of heart diseases have passed middle life, and therefore the crude death-rates should be used with caution and considered only in connection with the age distribution of the population.

(Pages 53 and 54).

In all subdivisions of the registration area the 1917 rate was the highest for the series of years shown.

The greatest increases among the states in the eight-year period 1910 to 1917 are for Maryland (from 131.6 to 189.1), Montana (from 67.8 to 100.9), New Jersey (from 137.2 to 169.2), New York (from 164.7 to 194.5) and Michigan (from 152.6 to 181.3).

Eight states have rates above 150 per 100,000 population for the series of years 1910 to 1917. Of these the following states show the highest rates in 1917: Vermont (215.6), New Hampshire (212.9), Massachusetts (202.8), New York (194.5), and Maine (190.4). The states showing the lowest rates in 1917 are Washington (75.7), Colorado (83.8), South Carolina (95), Tennessee (96.8) and North Carolina (98.5).

Rates of 150 or higher are shown throughout the series of years 1910 to 1917 for seventeen of the cities which in 1910 had 100,000 population or more. The cities which have the highest rates in 1917 are Washington, D. C. (250.5), Albany (249.5), Worcester (246.8), New Orleans (234.5) and San Francisco (226.5). The lowest rates in 1917 are for Spokane (56.5), Seattle (78.3), Portland, Ore. (85.9), Milwaukee (101.1) and Denver (105.8).

FEBRUARY 18

Industrial Surgery as Related to Orthopedic Surgery

BY J. TORRANCE RUGH, M.D.

I HAVE taken the liberty of changing the title of this paper from "Industrial Surgery as Related to Orthopedics" to "Industrial Surgery as Related to Orthopedic Surgery." This is done because of the commonly accepted limitation of the term orthopedic as applied to the mechanical side of this specialty, and in reality the mechanical side does not stand out as prominently in its relations to industrial surgery as does the surgical side. It is true that almost all orthopedic surgery is mechanical in principle, but it is advisable to distinguish between the use of braces, splints and other mechanical devices and the surgical work which is so essential to the securing of proper balance, proper function and as nearly normal contour as may be possible.

Industrial surgery is a striking example of the potent influence of capital upon scientific attainment or development. This observation is not made in a spirit of criticism, but is merely a plain statement of fact. Preventive and constructive surgery has been advocated and followed for many years by the medical profession. The orthopedic surgeon has long realized that it was vastly more easy and more important to prevent deformity following injury and disease than it was to correct it. He has also long realized more fully than the other surgical specialists the great economic loss both in time and in energy from the cripple who has not received the care and attention that were necessary to restore him to his proper place in the industrial world. With the tremendous increase in manufacturing, railroads, mining and all other lines of industry there has been a corresponding advance in the proportion of cripples. This arose from four sources: (1) The lack of sufficient safety devices and appliances in the matter of machinery and manufacturing environments; (2) the inexperience of workmen who are attracted to an unfamiliar job by the high rate of wages;

(3) the Workmen's Compensation Act, which provides a means of livelihood until the injured is able to resume his work; (4) the lack of standard and organized efforts on the part of the surgeon to restore the patient to economic efficiency at the earliest possible moment. Let us consider these for a moment: (1) The lack of safety devices is being gradually eliminated and machinery is being perfected so as to minimize the risk to the workers. Fool-proof machines, however, have not yet been devised, and there will always remain an element of danger from them, and they will constitute a source for the production of the disabled and crippled. (2) The *ignis fatuus* of the gold fields was not more alluring to the prospectors and miners than is the offer of high wages in many of our factories to the laborer and workman. What does it matter if he had no experience in this line of work? The fact that the high wages are occasioned by the greatly increased risk of the occupation does not concern him. He wants the increased pay regardless of the greater danger of the job, and if he is injured the law places the blame upon the employer. (3) The compensation afforded is not, of course, commensurate with the earnings, but there are many individuals whose minds become easily warped with injury or disease, and they become crippleized by the knowledge that so long as they can show disability they will receive compensation. Fortunately this class is but a small one and is becoming less through the prompt and at times drastic methods of the compensation boards, who are not in sympathy with such individuals. Furthermore, as it becomes known that this attitude of the injured cannot be maintained there will be still fewer cases presenting. (4) The lack of standard and organized efforts on the part of the surgeons in the case of these patients is now being replaced by the greatest possible zeal and activity toward rapid restoration to efficiency, and means and methods are being supplied in almost unlimited amount for the work. Through the impetus of organization of the surgeons of this type and class the work is going forward by leaps and bounds.

One may well ask, What are the driving forces behind this movement? They are chiefly two, as suggested above. The first

has been operative for many years, namely, the spirit of the medical profession as centered in the great work of preventive medicine and surgery. It has been actively and patiently advocated for years, but has not received the consideration it deserved because capital did not realize the tremendous economic loss sustained through the fearful toll of accidents and sickness until the law through the Compensation Act placed upon it the responsibility of these disabled and crippled. The workman was merely a means to the end—namely, to production—and so long as he carried his own responsibility capital was not concerned with what happened to him and the medical profession continued to advocate and work for the betterment of humanity through the elimination of the manufacture of cripples. When, however, law and a certain element of justice placed the onus of providing for the crippled or ill upon the employer, capital at once became interested and demanded the adoption of means and methods which would lessen this burden. This latter, of course, was in direct accord with the long-urged demands of preventive medicine and surgery, and was taken up with the greatest possible avidity and eagerness. This action so amplified the scope of the work of the company surgeon and so greatly increased the demands upon his care of the workman that it developed a practically new type of surgeon which has been most appropriately entitled the industrial surgeon.

I have always felt that industrial surgery should be classified as a connecting link between acute general surgery and orthopedic surgery. Its follower should combine the readiness and aptitude to manage the acute condition and its immediate complications with the enthusiasm and self-confidence necessary to carry this same case safely through to its successful termination. This latter ending is expressed for him in terms of economic efficiency, though the same result is also estimated by the orthopedic surgeon in terms of functional efficiency. The two branches of surgery overlap in many respects and each exerts a definite and oftentimes profound influence upon the other. Long before industrial surgery was recognized as demanding special qualifications on the part of its followers and special attention from the medical pro-

fession in general, orthopedic surgery was clamoring, in an organized manner, for the adoption of such procedures in disease and accident as would secure the greatest possible degree of functional efficiency to the affected part. Its surgeons were constantly called upon to deal with resultant conditions and were profoundly impressed with the possibility of prevention of so many of the permanently disabling conditions by the employment of different methods during the earlier stages of disease or injury. This demand for prevention and the very great possibilities in it have always been uppermost in the minds and in the aims of the orthopedic surgeons, and in recent years there has been a constantly increasing tendency to place in his charge those classes of surgical conditions which were extremely prone to result in deformity. This, as a practical move, has not been widely applicable because many acknowedged skilful orthopedic surgeons have not been trained in general surgery, and in reality the great mass of the acute work belongs to the general surgeon and is not desired by the orthopedic surgeon. What, then, are the factors which chiefly bear upon the success of the industrial work? There are mainly two in the abstract consideration of the problem. The first of these is the scope of the work.

Prior to its development into the present state of efficiency the company surgeon looked after the sick and injured of his corporation and treated them as he treated all his patients. If the worker was a self-reliant and self-respecting man he made every effort to hasten his recovery and coöperated with the surgeon so as to return to duty at the earliest possible moment. If he was of the indolent type he did not help himself or the surgeon and relied upon his relief societies and his family and friends to carry him along until either he recovered or was forced to go to work or became totally crippleized and a public charge. These two types are familiar to every surgeon who has had to do with mining and manufacturing interests. Now, however, industrial surgery includes all factors which concern the health and physical efficiency of the workman, looking first of all to the prevention of disease, illness and accidents among them. This is accomplished through

(1) Better home conditions for the employees. This includes not only the immediate housing but also the environments which determine community health, comfort and happiness. These beget contentment, and this is the most potent factor in efficiency and production. (2) Improved hygiene in the factory and in the working surroundings wherever they may be. This has been very greatly improved by the Bureau of Inspection of the state government, but the surgeon is directly concerned in it by reason of his interest in the plant and his fealty to his employers. (3) The education of the employees along lines of health and personal care, both as regards the interests of the other workers and as to the special forms of disease, illness and accident concerned with their special kind of labor. This is an extremely important and fertile field for work on the part of the surgeon and his untiring efforts will produce results that are most far-reaching both to employer and to employee. (4) The study of the problem of accident prevention, which is usually left to engineers. The knowledge of anatomy and physiology coupled with a study of human mechanics should fit the surgeon to aid greatly in this field of the work.

The second point in prevention is the rendering of prompt and efficient medical and surgical aid to the sick and injured. In this work the principles of orthopedics are most applicable, and to this we wish to devote more attention. The first thought in case of accident is the immediate condition of the patient and the care of the damaged part, and this is followed closely by the thought of the ultimate results to the patient. The time to cure a deformity is before it occurs. The problems, mechanical and otherwise, of the surgery of the injured are so varied and frequently so complicated that it may become difficult to determine which is of the greatest importance and how they are to be accomplished. Into these problems also enter the personal factors of the patient and of the surgeon, which will be considered later.

So many and varied methods of dealing with special conditions have been advocated recently that one cannot but realize we are in the stage of surgical and medical disorganization, from which

it is difficult to cull out the worthless and unproved. I believe this unrest and oftentimes revolutionary attitude toward the long-used and proved methods is mainly due to the sudden development of surgeons and orthopedic surgeons by the World War. Many of these have not been familiar with established methods and have endeavored to devise new ones, and meeting with a modicum of success in certain cases have enthusiastically proclaimed a new treatment. They have forgotten the old saying that "What is new is not true and what is true is not new." In the endeavor to establish a standard it is best to keep constantly in mind the older principles of treatment and to add to these only after most thorough and careful experience. To specify a few: The influence of rest in joint conditions is most beneficial, and when to begin mobilization of the joint requires knowledge, judgment and experience. In the slight joint injuries the important factor is the determination of what structures have been injured, as some recover so much more promptly than others, hence influence the treatment and care most profoundly. The treatment of fractures in the shaft of the bone or near a joint and whether one shall use the open or the closed method are still problems of extended discussion. In all of these, however, the principle of restoration or maintenance of joint function becomes of paramount importance, and this must be understood and observed by the surgeon from the beginning of the case. Another is the importance of rest to and protection from strain of muscles whose nerve supply has been destroyed. The amount of regeneration which will take place in an injured or severed nerve is always an unknown quantity and the muscle tissue must be safeguarded against the rapid trophic changes which follow the trauma, so that when repair occurs there will be proper structure to be actuated. A case of this type was recently referred to me by a most competent surgeon. The boy, aged eight years, had sustained a fracture about the elbow several years previously. After recovery there was a most marked ulnar (varus) deformity and the surgeon did a supracondylar osteotomy to correct this and restore the carrying function. A Volkman ischemic paralysis quickly fol-

lowed the operation and at the end of a year there is still contraction of the flexors and great weakness of the extensors. The cause of the occurrence could not be ascertained, but there was evident involvement of bellies of flexor muscles and some paralysis of the extensors. Physiotherapy had been used constantly for a year, but unsuccessfully. I applied a brace to the hand and forearm to stretch the flexors, and after six weeks the patient has gained considerable power of extension of the fingers and hand and it now appears as though further operation may not be necessary to secure good function. The results would have been better if the brace had been applied earlier in the case.

There are but a few points which the orthopedic surgeon finds of vital importance in general surgical conditions and which commonly bring him cases for reconstructive surgery. The trend of the general surgeon has frequently been so to deal with the present condition and rely upon subsequent efforts to overcome or correct unfortunate results, but under the impetus of the demands of industrial surgery this will become changed.

The third factor in conserving man-power in industry is through the active employment of efficient reconstructive measures to regain the highest degree of functional and economic efficiency. While these methods of restoration have long been employed for these cases the sudden demand for expansion to take care of the wounded soldiers and the remarkable results shown in so many and varied cases have stimulated their organized use in the restoration of industrial cases. The need of the constructive surgical operation is recognized and where special skill is required to secure the best results it is obtained. Failure to do so means economic loss and perhaps failure, with further loss to capital. At this point the intimate knowledge of orthopedic principles combined with the skill to do chronic surgery becomes of vital importance. Time is essential to results, but time is also valuable to the wage-earner and the economic problem must be carefully considered. Destructive surgery is sometimes strongly indicated to replace the constructive and the problems of economics are more insistent and more important than those of conservation of parts and func-

tions. To illustrate: A badly crushed or infected foot may be healed and restored by a year's patient and active treatment, but after the disease has disappeared the condition of the foot for efficiency must be considered. If it can be rendered strong and capable of enduring the demands of the laborer's position it should be given every care and attention to that end; but if there is a probability that it will be a damaged part, which will impair the earning capacity of the individual, it should be sacrificed and replaced ed by an artificial one which will ensure him an active future free from distress or worry. This destructive work is as much a part of reconstructive surgery as is an osteotomy, tenotomy, nerve anastomosis or any other form of operation and will oftentimes secure better results in a much shorter time. Knowledge, judgment and experience are essentials in the determination as to what to do, and, of course, success depends much upon the equipment in these essentials of the surgeon.

The second factor in the abstract consideration of the relation between industrial and orthopedic surgery is the surgeon himself. What are the qualities which will make him fit for a position such as is included in the scope of this work? First, he must possess professional and surgical ability. Prompt, thorough and skilful service must characterize his filling the position. He must be ready to meet the emergency and deal with the acute condition at once, and must be familiar with the peculiar situations that are incident to his own line of industry. He is serving not only his employers but also the employees, and both require his utmost and best efforts for their own individual purposes. The one is strongly tinctured with financial interest, while the other has both financial and sentimental by reason of those dependent upon him. To the true physician the interests are negligible, as he is concerned only with human life and health, and for this he will equip himself to deal efficiently with what may arise. Second, he must have executive ability, as he is dealing with an army and must be able to direct and command that coöperation which will ensure the desired results, that is, the best. His ability will command respect, and this is his best assurance of success. One

may never lose sight of the fact that the corporation, being devoid of sentiment, demands the man of ability because of the results which accrue to it through his efforts. There is no criticism of this attitude, as it ensures good results to the employee as well as to the employer, and secures a group of higher-grade men for this extremely important work than if the surgeon were employed without special selection.

Third, he must be observant and keen to take advantage of whatever will prove of value in the furtherance of his work. Recently I was in a large industrial hospital and found installed about twenty different forms of simple mechanical appliances for use in the after-care of the crippled. Of course, these are not absolutely essential to the work if there is a sufficient number of trained physiotherapists who can administer the necessary remedial measures. The mechanical appliances have an advantage, however, in that they appeal to the personal element and stimulate greater effort to accomplish certain results in the patient than if it were left to the physical operator. This factor is in itself one of the most important in gaining certain ends. It counteracts the tendency to mental brooding over his condition and prevents the warping of the brain that very commonly affects the cripple. They are prone to introspection and require constant stimulation to keep up their enthusiasm in treatment. The enlistment of their coöperation by mechanical or other means will aid very much in hastening recovery.

Fourth, the surgeon must be self-confident. This must be based on actual ability and knowledge. That which is assumed or has no foundation in fact will not prove lasting. Self-confidence in the surgeon begets confidence in the patient, and as after-treatment of so many of these cases extends over a long period of time this becomes extremely important. He must be an optimist and constantly buoy up the enthusiasm of the patient. Hopefulness of good results must be maintained at all costs. This quality is one of the most essential in the orthopedic surgeon, and unless the industrial surgeon has a good fund of this in his make-up he will fail to secure the desired results in a large number of cases.

He must also be resourceful to utilize the common though insignificant agents in which the layman places great confidence. Time is a great factor in accomplishing final results in the cripple, and his daily life must be occupied until the results have obtained. It is the psychologic side of the patient, and when this is utilized in the treatment the results will be both better and quicker.

These, then, constitute a few of the facts in the relation of industrial surgery and orthopedic surgery. Each has its own function and distinct place, but they are mutually dependent one upon the other for the recovery of the patient and for the prevention and correction of deformity.

The Field of Industrial Medicine in a Large Industrial Corporation

BY CHARLES B. WORDEN, M.D.

Assuming that the necessity for medical supervision of the employees of industrial organizations has made itself evident and that the specialty of industrial medicine has emerged from its somewhat disconnected progress into an entity of importance, it may be of interest to note where the lines of industrial medicine diverge according to the locality and type of industry and to review the common ground upon which they meet.

Industries located in isolated communities surrounded by homes, schools and recreative centers are fields for carrying out ideas of industrial medicine in their entirety. Here the workman's time spent away from his work can be studied—the other sixteen hours of the day—an element so elusive and important in getting the right perspective of the workman's health, knowledge of his work, recreation and home life.

Industries confined to the manufacture of particular products offer fields well adapted to the study of the industrial diseases pertaining to these particular processes, as workers in rubber,

leather, paint, high explosives and chemicals, while the industries concerned with the manufacture of the hard metals offer fields for the practice of emergency surgery as the occurrence of accidents is multiplied.

Somewhat in contrast to these industries is the field of industrial medicine found in a large mercantile establishment. The size is referred to, as it is usually among the larger groups of employed persons that the larger staffs of medical men are found, as well as more extensive equipment, making possible its broader principles in the application and research of industrial medicine.

The group of employees under discussion represents 6000 persons of both sexes, varying in age from fourteen to eighty-seven years, and including 1000 adolescents from fourteen to eighteen years of age, the latter fact being accounted for by the provision of a system of education allowing them to complete their schooling while making their entrance into industrial life. Located in the center of a city it is obvious that the homes of these workers are at considerable distances from their employment—in fact, extending into neighboring towns and states, at radii of ten, twenty and thirty miles. The comparison with isolated industries is seen in the different problems evolved for the effectual operation of a social service. In contrast to industries confined to the manufacture of certain products alone, in the case of large mercantile establishments there are numerous small factories representing a wide range of trades and occupations; in addition to the large selling and clerical forces there are few trades and crafts not represented. To a casual observer the range of duties in a mercantile plant might not appear so extensive, but its ramifications extending into factories and shops far removed from publicity and into power-houses and laundries, into basements and subbasements where all ventilation is artificial, are too numerous to mention. Laundry-workers in steam; workers in high temperatures, as stokers and cooks; workers inhaling irritating substances, as upholsterers, emery-wheel polishers and handlers of refuse; workers in leather, paint and chemicals (one of which is hydrocyanic acid); workers with irritating substances upon the skin, scrubbers, dishwashers, furworkers,

typesetters, talcum-powder grinders, chauffeurs, electricians, and mechanics are but some of the trades, crafts and occupations met with.

The general characteristics of industrial medicine in this type of industry are the number, ages and sex of the workers, its location in relation to their homes and the variety of occupations found; more detailed characteristics will be touched on as the work is further described.

When such medical work requires the attention of several physicians the one in charge must give his entire time to it, as much so as in any other specialty. He may call to his assistance men trained in special lines who can give part of their time with good results, but the industrial physician must be the specialist of industrial medicine, and he will find a field satisfying in its breadth and absorbing in its character. His special work commences where the work of the daily clinic ends, for his chief task is not in treating the sick and injured, but along the general lines of preventive medicine and along the special lines of investigation of the industrial hazard. Incorporated into the work of the daily clinic and in the conduction of the necessary physical examinations are the broader principles of instruction, prevention and research.

While the work of the daily clinic presents nothing novel or different from our hospital and dispensary clinics the industrial specialist is perhaps a little keener in his observation and investigation of the occupation of the individual coming for treatment. Excepted to this, of course, are the clinics in industrial medicine held in some of our hospitals; but, generally speaking, in taking histories the recording of the occupation is all that is required, and the detailed account of his duties and the environment while at work, holding the keynote of his ill health, is often overlooked. The industrial physician has the advantage of being able to observe at first hand such conditions and details. The statement of a boy that he works in a perfumery factory would not reveal the fact that he was breathing pulverized talc all day without a respirator; the statement of a man that he renovates furs would not exactly show the cause of an eczema of the face until the par-

ticular manner he had of blowing into the furs was shown; the possible exposure to certain chemicals may seem very remote until some time is given to ascertaining this possibility.

The Daily Clinic. The daily clinic of such an establishment is used very extensively and the preparation for it must include physicians trained in special lines as well as the clinician. The equipment must be the best obtainable and the rooms the brightest and airiest in the building. However, the housing and equipment of a medical department is not for exhibition purposes and is not visited except by patients and persons properly interested. A common waiting-room for the different offices is also the record room, and is in charge of a secretary. The trained nurse in charge is not an industrial nurse in the strict interpretation of that term, in that social service work or the variety of duties grouped under public welfare nursing are not a part of her duties. Her training must be of the best and not remote from recent practical hospital work, as the maintenance of asepsis, the preparation of solutions and dressings and the care of the surgical room must reach the standard of the best of hospitals.

The number of acute cases coming daily to this clinic is not out of proportion to the number of acute cases which would naturally occur in any body of 6000 persons of mixed age and sex, and this applies as well to the number of chronic conditions daily recognized and previously unknown.

Due to the overturn of employees more than 2000 persons are added each year to this clientèle. The clinic is open five hours a day and one or more of the physicians is present from the opening to the closing of the establishment. In a clinic having 2500 visits a month, physical examinations not included, the types of cases seen cover a wide range. Cases of exanthema, mouth-breathing and acne in the young to cardiovascular-renal changes in the older; nervous diseases ranging from the psychoneuroses to insanity; cases of talipes, flat-foot and scoliosis referred to the orthopedic surgeon; cases of appendicitis, gastric ulcer and cholecystitis requiring immediate hospital treatment; cases of arthritis and neuritis involving search for focal infections; accidents ranging

from minor injuries to crush cases; eye, ear, nose, throat and teeth cases; venereal, gynecological and the ever-present tuberculosis constitute a summary of the conditions which present themselves and provision for which must be made.

The record of the original physical examination is before the physician, and with the assistance of specialists, *x*-ray examinations and laboratory findings treatment is given to all patients able to remain at their duties; this applies to all cases except orthopedic cases and those requiring a gynecological examination. If unable to remain at work they are sent or conveyed to their homes or hospitals and their treatment left in the hands of the family or hospital physician.

In the cases of these, too ill to remain at their duties, it is wise to give no treatment unless imperative. During the influenza epidemic of 1918, and to a less extent the recent and present epidemic, many employees presented themselves with a temperature and symptoms requiring bed treatment. If they are given treatment and sent to their homes, would not such treatment be a menace, in that they would feel content that they were under treatment and would not feel compelled to call in their physician? The no-treatment plan was judged the safest procedure.

A frequent conception of clinical work in industrial medicine is that it is confined to first-aid work. There are many reasons why this is incorrect. First-aid treatment might apply to some of the accident cases, but it cannot be applied to the treatment of persons complaining of subjective symptoms: the term first diagnosis is more applicable.

There are a number requiring immediate bed treatment, and connected with the clinic there are two small wards containing fifteen beds in charge of the second nurse detailed to their care. These wards, then, for bed treatment do not functionate as a general hospital for the above reasons: they functionate more as a small evacuation hospital.

With this equipment is it the function of the industrial medical department to take over cases for complete treatment, bed treatment and nursing as do our hospitals? This may be its function

in isolated communities, but in the center of a large city, near and in touch with many hospitals, decidedly it is not. It is, moreover, the function of industrial medical work to be ever-cognizant of the interests of the family physician and to maintain affiliations with our hospitals and public health service, as, after all, this body of employed people is but a unit of the community and many of its problems are civic and public ones.

Nose, throat and ear cases are treated at a daily three-hour clinic. Operations requiring bed treatment, as tonsilectomies, removal of adenoids and operations upon the sinuses and mastoid are referred to the different hospitals. All other ground in this specialty is covered and it coördinates with the general clinic in examining all cases referred for tonsil, sinus or middle-ear foci. The clinic for diseases of the eye is held every second day, and this field is covered with the exception of operations upon the eye. The industrial function of the eye specialist is in investigating the lighting, particularly artificial lighting, arrangements. The dental work covers an extensive field. Starting with giving instruction in dental prophylaxis, personal talks, toothbrush drills, inspection of mouths and cleanings, it gives daily treatments for pyorrhea, gingivitis and acute teeth conditions, and completes its service by supplying fillings, *x*-ray films, extractions and replacements by artificial teeth, plates and bridges, which requires the services of several dentists.

Physical Examinations. These are made with explanations of the reasons therefor and advice is given as the examination proceeds. Obviously all contagious diseases, cases of low vitality, tuberculosis, chorea, epilepsy and marked degrees of ill-health cannot be accepted. A large class of the middle-aged with some organic defect presents some problems. Individuals with a compensated heart lesion, a high blood-pressure, speech defects, deaf-mutism, marked refractive errors, congenital hip-dislocation, kyphosis and persons with amputated limbs, and cretins have their proportionate value to industry and on their own part must earn a living wage. Advising with the employment bureau, the best judgment and advice are called for in assigning them to

duties they are physically able to perform. Another class requiring particular advice are those in middle life who have never worked before, though organically sound. Nervous, they are inclined to stand routine work very badly.

Doubtful cases are given the opportunity to show how well they can stand new duties and their examination is deferred for a reasonable time.

Instruction in personal hygiene is given to this body of people by means of talks, bulletins, placards and moving pictures. Talks on teeth prophylaxis and toothbrush drills are given by one of the dentists and a woman physician gives talks to the girls and young women on the subject of sex-hygiene and personal hygiene.

Individual instruction in the fundamentals of the care of the health is given, as already suggested, by the physicians and nurses in the numerous contacts that are made possible in the clinics. No chance is lost to emphasize the value of fresh air, outdoor exercise, proper sleep, food, bathing and care of the bowels and the teeth. Practically these ideas are applied by supervision of dietaries; installation of shower baths; supervision of rest periods; coöperation with proper heads on questions of heating, lighting, ventilation and sanitation; coöperation with every activity pertaining to physical exercise, athletics, military drills and summer camps; repeated examination of food-handlers and making use of a tuberculosis camp.

This summarizes the medical duties in this particular establishment and is more or less common ground of all well-organized industrial medical plants. The special work and the diverging lines depending upon the type of industry constitute the special field offered the industrial medical man. That type of occupation and environment at work constitutes a potent cause of disease, and that personal investigation of these conditions is necessary to understand them there is no doubt. Edsall found at the clinic for industrial diseases at the Massachusetts General Hospital one in every ten among the first 5000 cases referred was suffering from some diseases attributable to their occupation.

The opportunity for the study of every phase of the industrial

hazard or every condition which affects the health of the employed individual unfavorably is here presented, and it rests with the industrial physician himself to what extent this is taken advantage of and upon just what plane he will place the specialty of industrial medicine.

MARCH 17

Provisions in the Workmen's Compensation Act of 1919 for Paying Hospitals

BY HERMAN B. ALLYN, M.D.

The Workmen's Compensation Act of 1915 as amended in 1919, contains under Article III, Section 306, paragraph E, provision for paying for "reasonable surgical and medical services," and then adds: "The cost of such services, medicines and supplies shall not exceed one hundred dollars." Later on in the same paragraph of the section occur the words: "In addition to the above services, medicines and supplies, hospital treatment, services and supplies shall be furnished by the employer for the said period of thirty days. The cost for such hospital treatment, services and supplies shall not in any case exceed the prevailing charge in the hospital for like services to other individuals." The words "in addition," which begin the paragraph referring to hospital services, were not in the original act of 1915, but were added when the act was amended in 1919. They seem to make it clear that hospital services are to be provided when necessary and that the cost of furnishing them is not to come out of the sum (one hundred dollars) allowed as a maximum for reasonable medical and surgical services and provided for in the early part of paragraph E, Section 306, of Article III.

Moreover, the apparent intention to provide for hospital services, in addition to medical or surgical services, is further borne out by the following paragraph (F), which declares that in case

of the death of the employee the period during which compensation shall be payable to his dependents shall be reduced by the period during which compensation was paid to him in his lifetime. But it then adds: "No reduction shall be made for the amount which may have been paid for medical and hospital services and medicines, nor for the expenses of the last sickness and burial." It seems to me that if two distinct payments, one for medical and one for hospital services, had not been in mind the clause would have read "medical or hospital services." In paragraph 7, of Section 307, there is a provision for the payment to dependents of "the reasonable expenses of the last sickness and burial, not exceeding one hundred dollars (without deduction of any amounts theretofore paid for compensation or for medical expenses)." Nothing is said about hospital services here, but it is clear that medical services are not included in the allowance for burial expenses.

The period during which the cost of hospital services shall be paid is apparently, as in the case of medical services, the first thirty days after disability begins.

The attitude of the hospital toward its medical staff, as regards pay for services rendered to patients in the hospital, finds its explanation partly in the historic fact that doctors have always gloried in the healing art as a profession which sought to relieve the sick and the suffering as a duty which they owed to humanity; any money reward which might come to them they were willing to consider as secondary in importance and to leave to the sense of justice and gratitude of their patients. The explanation of the attitude of hospital to staff is partly also that the hospital itself was in the beginning an outgrowth of a desire on the part of doctors and philanthropic laymen to provide medical care for those who while ill were too poor to be cared for to the best advantage in their homes. Its chief population for a long while were the sick and the indigent; the well-to-do were conspicuous by their absence. To this day many Philadelphians belonging to the latter class have a strong prejudice against going to a hospital. But hospitals have changed. Private rooms are provided. The rich and well-to-do

are more than willing to go, because they find they can obtain better care with less disturbance of the household. The hospitals are crowded and the charge for ward patients is sometimes as high as it used to be for the lower-priced private rooms. Hospitals are no longer for the poor and needy, but for the rich, or the well-paid wage-earner. The hospital is no longer merely for charity, and therefore the doctors who give of their time and skill should not be expected to do it for nothing. I believe the time is coming when it will be necessary to pay interns a small sum. It would be only just. Also, that when the hospital receives money for the care of ward patients the visiting chief should receive a portion of it, the amount to be collected from the patient and paid by the hospital to the doctor.

While not strictly germane to the workmen's compensation, nevertheless the latter subject is inextricably bound up with the question of fees. I hope I may be permitted to say that the basis upon which the great majority of physicians rest their charges is altogether wrong. Most physicians charge so much for office visits and so much for house visits. The proper basis of charge is the value of the service rendered, which may be more or less than that usually charged for a visit. It requires more skill to carry a patient successfully through pneumonia or scarlet fever or diphtheria than to perform an ordinary operation for appendectomy or tonsilectomy. But the charge made by the physician and the surgeon are often widely different. Patients have been educated to pay a special fee to a surgeon; they must be trained to pay the physician a fee corresponding with his skill, experience and judgment, as well as for the time and attention given the patient. Advice should not be rated as worth only so much a visit, but worth a fee commensurate with the knowledge and judgment of the man who gives it: in other words the fee should stand in relation with the value of the service rendered.

I believe that if such a system of charging, according to the service rendered, became common it would be better for the community as well as for the doctor. The doctor would be held in higher esteem, he would be able to keep his equipment up to date and the patient would be more skilfully cared for.

Provisions of the Compensation Law for Paying the Surgeon's Fee

BY MOSES BEHREND, M.D.

Since the establishment of the Workmen's Compensation Law a new task has been imposed on the physician, namely, the interpretation of that law. We need not be lawyers to be able to construe its meaning or its intent. Framers of laws are not always concise enough, a fact which frequently leaves a loophole for argumentation; but this is a characteristic of laws in general, and the compensation law is no exception to the rule.

There is no specific reference in the compensation law as to how the surgeon should be paid. Section 306 reads thus: "During the first thirty days after disability begins the employer shall furnish reasonable surgical and medical services, medicines and supplies as and when needed, unless the employee refuses them, to be furnished by the employer. The cost of such services, medicine and supplies shall not exceed one hundred dollars. . . . In addition to the above services, medicines and supplies, hospital treatment, services and supplies shall be furnished by the employer for the said period of thirty days. The cost for such hospital treatment, service and supplies shall not in any case exceed the prevailing charge in the hospital for like services to other individuals."

The intent of the law is plain. There does seem to be a division of the patients into two classes: those who are treated at home, not needing hospital care, and those who require the services of the surgeon in the hospital. Compensation for treatment of patients of the first class is clear; a difference of opinion exists in those cases that require hospital care. In such cases the law states that the hospital may charge an extra fee in addition to the surgeon's limit up to one hundred dollars. It surely was not the intention of the framers of the law that they expected the surgeon to give his services gratis. As a matter of fact it was the

intention of the various representatives who met to frame the compensation law that the surgeon's fee should be entirely independent of the hospital fee.

The status of the patient coming under the compensation law is changed entirely; he is not a ward patient any longer and cannot be placed in this category. If the patient is placed in the ward he must be charged the usual ward rate, but there is no objection to placing him in a private or semiprivate room and charging him the usual rate for these rooms, provided the hospital expenses, irrespective of the surgeon's fee, do not exceed one hundred dollars.

There cannot be any objection on the part of the hospital to the surgeon collecting his fee, because the employer is paying the insurance companies for this increased protection. Under these circumstances the surgeon is entitled to collect a just fee for the protection given by the insurance companies to the employer.

As chairman of the committee appointed by the President of the Philadelphia County Medical Society to delve into the intricacies of the law, it was thought best to address a circular letter to representative physicians asking their opinions as to who shall collect and be credited with the surgeon's fee. There was a very unanimous opinion expressed by many prominent members of the profession to the effect that the surgeon is entitled to his fee under the act of June, 1919. The physicians who responded to the letter of the committee included Drs. Keen, de Schweinitz, Frazier, Roberts, Harry Deaver, Frank and Levi Hammond, Martha Tracy, Jopson, Montgomery, Nassau, Schwenk, Radcliffe, Morgan, Pfahler, Northrop, Krusen and others. When there is such a unanimity of opinion on one point by the various specialists in medicine it illustrates that the profession is aroused and is at last awake to a realization of its just deserts. While there was some difference of opinion as to who shall collect the fee, the hospital or the surgeon, there was no difference of opinion as to who shall be credited with the fee.

The matter of collecting the fee has been settled in this jurisdiction, as illustrated by the following instance:

On January 9, 1920, an accident case was admitted to the Mt.

Sinai Hospital. It was necessary to amputate one finger and part of another finger. The superintendent of the hospital requested that my bill be included in the hospital bill. Some weeks later the adjuster of an insurance company called me on the telephone and informed me that the chairman of the Compensation Board ruled that the surgeon must submit an individual bill for services rendered. This is as it should be and the committee above referred to has recommended that in the future a separate bill shall be rendered by the surgeon for his services.

The attending physicians and surgeons to hospitals give at all times the best that is in them, whether the cases be ward or private. This should be encouraged and the compensation derived from this class of cases will stimulate the surgeon to better efforts and give closer attention to these cases than he has done in the past and not relegate them, as has been too often done, to the interns. A closer inspection on the part of the attending surgeon will shorten the patient's stay in the hospital and his early return to his employer will be much appreciated.

In closing I would emphasize the fact that a closer affiliation must be fostered between the boards of the hospitals and its medical staffs. It must be impressed on these men that the doctors are not merely servants, but that they are an integral part of the machinery of a hospital.

Workmen's Compensation Law of Pennsylvania in 1920—Brief Sketch of the Law's Provisions

BY WALTER H. BLAKESLEE, M.D.
MEDICAL EXAMINER OF THE WORKMEN'S COMPENSATION BOARD

Political economists, sociologists and all thinking people interested in the advancement of our social order have concluded that the theory of compensation is the best solution of the relationship between the employer and his injured employee. During the last fifteen years the development of legislation for workmen's

compensation for industrial accidents in Europe and America has been extremely rapid; in fact, it may be questioned whether any other subject of labor legislation has ever made such rapid strides or secured for its principles such general acceptance in so short a period of time. In all countries in which legislatures have introduced compensation for industrial accidents they have all recognized the principles of compensation as distinguished from the older idea of the employer's liability, which had been previously accepted by the common law throughout the world.

The period of investigation and education in respect to compensation began earlier in European countries than in the United States. But since the initiative has been taken in our country, investigation and study have been rapidly followed by legislative action, so that today in the majority of the states and the territories of our union compensation laws have been enacted.

Society has decreed that accidents in industrial establishments must be considered as one of the inevitable costs of production and that the fault or the negligence must not be charged to either the employer or the employee. This social decree has formed the basis upon which all the laws have been enacted—that is, that injury is an inevitable result of industrial activity, the cost of which must be counted in money and human sacrifice, and that a fair return for both must be paid by the consumer.

With these principles in mind the legislature of Pennsylvania, in 1915, enacted the Workmen's Compensation Law, which became effective January 1, 1916. Important amendments were made two years later and are now in force, and control the administration of this important law.

Under this law all persons who labor and occupy the relationship of employer to employee or master to servant were brought under compensation, except the agricultural worker, the household servant, the casual employee and the homeworker.

The physician is brought into relationship with the act only when called upon to treat or to examine an employee who has been injured or has met with an accident in the course of his employment. Section 301, of Article III, declares that:

"The terms 'injury' and 'personal injury' as used in this act shall be construed to mean any violence to the physical structure of the body and such disease or infection as naturally results therefrom; and wherever death is mentioned as a cause for compensation under this act it shall mean only death resulting from such violence and its resultant effects, and occurring within three hundred weeks after the accident. The term 'injury by an accident in the course of his employment,' as used in this article, shall not include an injury caused by an act of a third person intended to injure the employee because of reasons personal to him, and not directed against him as an employee or because of his employment; but shall include all other injuries sustained while the employee is actually engaged in the furtherance of the business or affairs of the employer, whether upon the employer's premises or elsewhere, and shall include all injuries caused by the condition of the premises or by the operation of the employer's business or affairs thereon, sustained by the employee, who, though not so engaged, is injured upon the premises occupied by or under the control of the employer, or upon which the employer's business or affairs are being carried on, the employee's presence thereon being required by the nature of his employment."

An accident is commonly defined as "a sudden sharp and brief experience usually due to some external force or circumstance likely to attract the attention of the subject and of others, and thus readily fixed in time and connected with a definite environment or employment."

Therefore, an accident or injury, as just defined, when received by an employee, is the determining factor in the application of our compensation law.

The physician having been brought into contact with the law by reason of an injury to his patient is subject to the provisions of that law in just the same manner as the injured employee is bound by its provisions. An examination of our law discloses the circumstances under which the physician is brought into it as follows:

1. The rendering of medical, surgical and hospital treatment immediately after an accident as set forth in Section 306–e, which reads as follows:

"During the first thirty days after disability begins the employer shall furnish reasonable surgical and medical services, medicines and supplies as and when needed, unless the employee refuses to allow them to be furnished by the employer. The cost of such services, medicines and supplies shall not exceed $100. If the employer shall, upon application made to him, refuse to furnish such services, medicines and supplies the employee may secure the same, and shall receive from the employer the reasonable cost thereof within the above limitations. In addition to the above services, medicines and supplies, hospital treatment, services and supplies shall be furnished by the employer for the said period of thirty days. The cost for such hospital treatment, services and supplies shall not in any case exceed the prevailing charge in the hospital for like services to other individuals. If the employer shall refuse reasonable surgical, medical and hospital services, medicines and supplies, tendered him by his employer, he shall forfeit all right to compensation for any injury or any increase in his incapacity shown to have resulted from such refusal."

2. The rendering of surgical, medical and hospital treatment in the employee's last illness in case of fatal injury, according to Section 307–7:

"Whether or not there be dependents as aforesaid the reasonable expenses of the last sickness and burial, not exceeding one hundred dollars (without deduction of any amounts theretofore paid for compensation or for medical expenses), payable to the dependents, or, if there be no dependents, then to the personal representative of the deceased."

3. Examination of an employee at the request of the employer or upon the request of a referee or the Compensation Board as set forth in Section 314, which reads as follows:

"At any time after an injury the employee, if so requested by his employer, must submit himself for examination, at some reasonable time and place, to a physician or physicians legally authorized to practice under the laws of such place, who shall be selected and paid by the employer. If the employee shall refuse, upon the request of the employer, to submit to the examination by

the physician or physicians selected by the employer, the Board may, upon petition of the employer, order the employee to submit to an examination at a time and place set by it, and by the physician or physicians selected and paid by the employer, or by a physician or physicians designated by it and paid by the employer; and if the employee shall, without reasonable cause or excuse, disobey or disregard such order, he shall be deprived of his right to compensation under this article.

"The Board may at any time after such first examination, upon petition of the employer, order the employee to submit himself to such further examinations as it shall deem reasonable and necessary, at such times and places and by such physicians as it may designate; and, in such case, the employer shall pay the fees and expenses of the examining physician or physicians and the reasonable travelling expenses and loss of wages incurred by the employee in order to submit himself to such examination. The refusal or neglect, without reasonable cause or excuse, of the employee to submit to such examination ordered by the Board, either before or after an agreement or award, shall deprive him of the right to compensation, under this article, during the continuance of such refusal or neglect, and the period of such neglect or refusal shall be deducted from the period during which compensation would otherwise be payable."

Therefore, the Act places upon the employer the responsibility of furnishing reasonable medical, surgical and hospital services, and medicines and supplies; this responsibility carries with it the power of selection by the employer, which is entirely right and proper, because the selfishness of the employer prompts him to provide the best medical treatment for his employee, so as to reduce to a minimum the period of disability and the amount of indemnity.

That section of the Compensation Act which has attracted the most attention from the medical profession and caused the greatest amount of comment among its members is Section 306–e, which refers to the length of time of treatment and the fees to be paid. It specifically states that "during the first thirty days after dis-

ability begins, reasonable medical and surgical services, medicines and supplies shall be furnished by the employer, the cost of which shall not exceed one hundred dollars. In addition to the above services, medicines and supplies, hospital treatment, services and supplies shall be furnished by the employer, the cost of which shall not exceed the prevailing charge in the hospital for like services to other individuals." According to a minute passed by the Compensation Board the cost of such hospital treatment, services and supplies shall not exceed $100.

According to the compensation law, therefore, definite provision is made for the payment of the physician for his services for a specified time—$100 as a maximum for thirty days—and in like manner the hospital is paid for its services. From the wording of this section of the law it was evidently intended to keep the physician's account separate from the hospital's account, except as has been otherwise provided for in specific cases.

A specified fee as a maximum for thirty days is established by law for the payment of the physician for his services, and the amount to be paid in each case is governed by the nature and extent of the services rendered within a given time. Under these circumstances, then, the physician is entitled to remuneration for services rendered whether called directly to the case or indirectly by the hospital as a member of its staff. The law makes no discrimination in this respect.

It has been argued that a physician on the staff of a hospital receiving state appropriation cannot charge for his services. That condition applies to charity cases only, and as compensation cases are not charity cases there is no conflict with the law governing state appropriations for a staff physician to charge for services rendered to compensation cases.

Under our present Act ample provision is made for the payment of the physician for thirty days' treatment, based on the average charges made to a workman earning from $1200 to $1500 a year if he himself had to pay the bill. About 75 per cent of the cases are recovered within thirty days; the additional treatment required for the remaining 25 per cent of the cases, having a disability

period exceeding thirty days, can be met by special arrangements with the parties in interest. In our experience the majority of such cases requiring prolonged and special treatment have been taken care of in this manner.

Of paramount importance in the administration of compensation is the securing of competent and efficient services to the injured workmen. Such services minimize the period of disability and suffering, reduce the loss in wages and are a distinct economic gain to the community. Therefore all our energies should be directed toward bettering this service.

It is suggested that the first step in improving the medical service is the establishment of a standard fee schedule. This should be a minimum scale that would be charged a workingman earning $1200 to $1500 a year, subject, however, to modification in certain contingencies. Many of our bad clinical results and the lack of good surgical skill have no doubt been due to the fact that the fees have been so low that the busy and capable surgeon could not afford to turn aside from his private cases to care for industrial accident cases. Such a schedule should be compiled by representatives from the State Medical Society and the Compensation Board. Several states of the Union—Oregon and Washington—have adopted not only a fee bill but also certain rules that serve to eliminate many of the difficulties encountered in settling the payment of fees.

The selection of competent specialists in the larger communities of our state to make special examinations is another factor in the betterment of the medical services. The selection of such specialists serves not only to focus the attention on the particular injury and the special treatment required, but also as a means of determining the presence of disease that may be coincident with but not the result of an industrial injury.

Medical service would be improved by paying more attention to reconstruction work or rehabilitation. While the main consideration in the past in treatment has been the restoring of the wage-earner to productive activity, nevertheless the full measure of compensation until rehabilitation has been effected and the injured workman is enabled to live a life of usefulness. The

additional costs incident thereto are an investment of inestimable value.

Reconstruction, reëducation and accident prevention are three prime factors in reclaiming the industrial cripple from the human scrap heap. He presents the same social economic and humanitarian problems as the war cripple, and the number of the former far exceeds the latter. With the reëstablishment of earning capacity the problem of the industrial cripple is solved. Contentment prevails only among those who are able to work and do work. Neither funds nor medical aid should be limited if restoration of function in whole or in part can be had. Reëducation should accompany reconstruction; the shaping of the mental attitude and the cultivation of the determination to do should be employed early in the disability period. We now consider an injured man in terms of humanity, not in dollars and cents like a slave. A blind man or one minus an arm or leg should not be an object of alms on our business thoroughfares, discontented, an object of pity and a burden on society, but he should be so reconstructed and reëducated that he becomes a producer and a useful member of society. Our problem so teems with human interest and importance that it seems almost sacred. Our great state of Pennsylvania is striving to meet this problem through its Bureau of Rehabilitation recently established by legislative enactment, and we prophesy for this state agency a fertile field of usefulness.

This brief paper is presented for the purpose of eliciting criticism of the compensation side of sociological medicine in order to provoke a wholesome discussion that will be mutually beneficial.

Hospital Treatment of Compensation Cases

BY DANIEL D. TEST

PRESIDENT OF THE ASSOCIATION OF HOSPITAL SUPERINTENDENTS

(By Invitation)

Hospital superintendents have been severely criticised by some doctors for what the doctors have felt has been an unfair

attitude toward them. I am glad to have the opportunity to state the case as I see it, because I believe that many of the irritations which have arisen have been the result of misunderstandings and misinterpretations. Most of the differences of life seem to come from a lack of understanding between individuals and groups.

The old law so far as it related to medical service was unsatisfactory in every particular and it was hoped that the revised law would leave nothing to be desired, especially in its interpretation and application. But notwithstanding the sincere efforts to this end which were made by the Compensation Board, the medical societies and the Hospital Association, we still have a law which is neither definite nor clear. I do not know whether the Compensation Board has placed an interpretation on it or not, and even so it may take a court decision to finally dispose of the matter.

You doubtless know already that the new law is as follows: During the first thirty days after disability begins the employer shall furnish reasonable surgical and medical service, medicines and supplies, as and when needed, unless the employee refuses to allow them to be furnished by the employer. The cost of such services, medicines and supplies shall not exceed one hundred dollars. . . . In addition to the above services, medicines and supplies, hospital treatment, services and supplies shall be furnished by the employer for the said period of thirty days. The cost for such hospital treatment, services and supplies shall not in any case exceed the prevailing charge in the hospital for like services to other individuals.

It seems very clear that when a doctor treats a patient in his office or in the patient's home he is entitled to compensation not exceeding $100 for services, medicines and supplies. When a patient is admitted to the hospital, however, medicines and supplies are furnished by the hospital. Secondly, the law says: "In addition to the above, hospital treatment, services and supplies are to be furnished." What does hospital treatment and services mean? I think we would all feel that without the doctor's ser-

vices included they would mean very little. However, it is reasonable for us to assume that the law recognizes the fact that the doctor should receive a fee and the hospital should be paid for its services. If this is the case, why does not the law say so without beclouding the issue? The ways of the lawmakers are past finding out.

To state my creed in the beginning, I feel that the doctor should receive pay for his work with industrial cases. I have never thought otherwise, although I have been accused of it. But when a case is admitted to a hospital I do not think the doctor should receive a fee until after the hospital has been paid the cost of maintenance, nor do I think that the public wards of a hospital should be opened to a fee system. How, then, is the situation to be met? The only answer seems to be the establishment of pay wards, and I believe that in addition to industrial cases the public will demand such services in the near future. I do not refer to what we call semiprivate rooms, but wards where the patients pay a price approximating the cost of maintenance and where they are not thrown with the riffraff which frequently fill the public wards. At the present time this would mean a charge of $3.50 a day instead of $2.50, and I am wondering how the employers and insurance companies will react to this suggestion. Some of them feel that they are already paying too much, but the time will surely come when industrial concerns will realize that they should not expect public bounty to pay any part of their cost, and when the insurance adjuster will entirely get away from the old-time practice of hammering the settlement down to a minimum instead of considering the justice of the case. I am glad to say there is very little of this today.

If you ask me to defend my objections to opening the public wards to the fee system, I would call your attention to the object for which hospitals were founded and have always been maintained and to the principles which the doctors of those early days enunciated. Hospitals were founded for the care of persons suffering from disease or injury who were without means or with insufficient means to be cared for at home. To make the plan complete the

prominent doctors of the day offered their services *gratis*, declaring that the opportunity to practice in a hospital and to send to the hospital poor patients who applied to them for treatment was ample return for their services. The hospital at once became a "friend in time of need."

As time went on there was a demand for the treatment in hospitals of persons who not only were able to pay for good accommodations, but also were able to pay a doctor's fee. Thus the private room and semiprivate room services were begun, and to this extent the hospital was properly commercialized, and the fee system may properly be extended to pay wards; but it is the very decided feeling of hospital managers and administrators that the placing of the public wards on a commercial basis by allowing doctors to charge fees to patients in these wards would in time take away from the hospitals that human touch which keeps them in a class removed from commercialism and would lay waste the real object for which they were founded. Are the doctors today willing to tear down the structure which was so wisely builded by their predecessors? I am willing to rest the case on the firm belief that after carefully considering the case a large majority of the doctors will answer no. Perhaps I hear you say, "This is all very well, but the law guarantees us a fee." So it does, but the law does not ask the managers of hospitals to open their public wards to the fee system, and I have faith to believe that the doctors will not ask them to do it.

If I am asked to defend my position, that the doctor should not receive a fee until the hospital has been paid the cost of maintenance, I must say that I do not think it needs much defence. If a doctor were conducting a private hospital he would have to pay the full cost of support before he would have a profit which is equivalent to the fee, and I do not believe that anyone, after duly considering the matter, will expect the hospitals to pay part of the support of a patient from the charitable funds in order that the doctor may have the money. The doctors would not solicit contributions on such a basis to make up the deficit, and I am sure they will not expect the hospital authorities to do so.

A committee of the hospital association has recently considered this matter and its decided and unanimous findings were substantially what I have here outlined. This committee was composed largely of doctors, two superintendents, who are also interested in the practice of medicine, and two other doctors who are hospital managers, one a teacher and the other a surgeon. So if you think I have been preaching strange doctrine, do not blame it entirely on the erratic brain of a lay superintendent. I am glad to be able to state that the staff of the Pennsylvania Hospital approves the position taken by the committee.

The next step is more difficult. If we decide the plan suggested is a good one, how are we going to carry it out? What if the Compensation Board and the employers refuse to pay the cost of maintenance, and what is to be done until such time as the hospitals can provide pay wards? In very many cases this means physical changes in the buildings, which may be difficult. (1) I do not believe the Compensation Board will stand in the way of any reasonable adjustment and I do not think the employers and insurance companies can long justify their claim to charity. (2) So long as compensation cases are treated in the public wards at a price below maintenance cost the hospital should be allowed to collect the whole amount and pay the doctor a salary commensurate with the amount collected over cost, or, better still, the doctor should collect the entire amount and pay the hospital. This suggestion also comes from a practising physician, so it is not entirely the product of a layman.

You may say that this is whipping the devil around the stump, but it is only suggested as a temporary arrangement and it does not open the ward to a system which would justify the doctor in charging a fee to any or all ward patients. Such a practice has been tried and has proved disastrous more than once.

There may be other and better suggestions how to meet the case and I shall be glad to hear them. If there can be no adjustment, then I would have to take the position that there should be no fee in these cases. To refer to the conditions which existed under the old law seems a backward look, but there is no use

trying to veil the fact that considerable feeling still exists toward the hospitals, and if we are to reach a plan of coöperation we must discover the cause and try to remedy it. Much of the antagonism which existed under the workings of the old law seems to have been carried over and forms the basis of this feeling and therefore should be considered.

As you already know, the law of 1915 stated: "During the first fourteen days after disability begins the employer shall furnish reasonable surgical, medical and hospital services, medicines and supplies. . . . The cost of such service, medicines and supplies shall not exceed twenty-five dollars unless a major surgical operation shall be necessary."

The services to be rendered for the minimum sum of $25 and for the maximum sum of $75, where a major operation was necessary, were described in exactly the same words, but because operation was mentioned some surgeons immediately interpreted it as meaning that the difference between the $25 and $75 was a fee for the surgeons. I am informed that those who framed the law did not go so far as to think of the hospital and the doctor as separate factors. They did recognize, however, that a larger payment should be made for a serious case wherever treated. As we all know, the law was a failure from every point of the compass excepting that it did recognize that the employer had a responsibility to the injured employee. The position of the hospitals at the time was the same as it is today, and if we accept the principle that the hospital should be paid the cost of maintenance the position taken by those who felt that the doctor should have the $50 whenever a major operation was done was wrong, and if such an attitude is to control the operation of the new law I am afraid the doctors and the hospitals must continue to disagree. I refer to this because hospital authorities, so far as the matter has been canvassed, are anxious to find an equitable and satisfactory basis to work on, but they cannot meet some of the radical views which have been voiced in the past.

There were comparatively few major operations on industrial cases, so that the money involved was not worth the discussion

that it caused; but there was a principle involved and on this principle the hospitals stood.

A patient suffering from a serious injury and requiring a major operation, remained in a hospital one hundred and fifty days. The cost of maintenance at the time was $2.50, making an expense of $375 to the hospital. Tell me in all fairness—should the surgeon have received $50 of the $75 paid by the employer? And there were may cases similar to this. To be sure, there were cases in which the $75 slightly more than paid the cost, but in view of the fact that the expense of caring for many patients who did not have a major operation far exceeded the allowance of $25, so that the hospitals were never reimbursed for their money outlay on these cases; many hospital staffs did not want a share of the receipts. If some doctors felt that the hospitals were unfair for wanting to keep all the money, the hospitals in turn felt that after having been bled white by the free care of industrial cases which furnished the doctor needed clinical material it was unfair for them to ask a fee before the hospital received the maintenance cost.

The question of ambulatory cases is one on which there are honest differences of opinion. Many doctors feel that, after giving first aid, the hospitals should refuse to treat such cases, and I quite understand this feeling on their part. On the other hand, should the hospitals which have hitherto maintained free dispensaries, which the doctors have been very glad to attend, be bowled out the moment there is any money in the case? And should the hospitals refuse to treat a case when specially requested to do so by someone who, by his contribution or taxes, helps to support the hospital? Some firms have found that many doctors of good standing are not so well equipped to care for surgical cases as the hospitals and have insisted on sending their patients to the hospital. Also, the hours of a doctor who has an active practice are a little more uncertain and the question of prompt service is an important factor where the employee is able to continue his work. However, if these cases are to be treated by the hospitals they should be treated in special pay clinics and the surgeon in

charge should be paid a salary or given a percentage of the receipts. I personally prefer the salary plan. We have had such a clinic at the Pennsylvania Hospital for nearly three years.

In conclusion, the attitude of every one of us must be one of justice and not one of getting all the traffic will bear. We will never reach a proper solution of our problem until the game becomes a four-cornered one—until doctor, hospital, employer and employee can meet on a common ground of justice, and I do not think that I am soaring into the land of dreams or looking for an early coming of the millennium when I say we will soon reach that goal.

The Pennsylvania Workmen's Compensation Act of 1915 as Amended in 1919, Defining the Liability of an Employer to Pay Damages for Injuries Received by an Employee in the Course of Employment

BY CHARLES A. E. CODMAN, M.D.

The following interpretations and definitions are taken from the law:

Section 104. The term "employee" as used in this act is declared to be synonymous with servant, and includes all natural persons who perform services for another for a valuable consideration, exclusive of persons whose employment is casual in character and not in the regular course of the business of the employer, and exclusive of persons to whom articles or materials are given out to be made up, cleaned, washed, altered, ornamented, finished or repaired, or adapted for sale, in the worker's own home, or on other premises not under the control or management of the employer.

Section 301. The terms "injury" and "personal injury" as used in this act shall be construed to mean only violence to the physical structure of the body, and such disease or infection as

naturally results therefrom, and wherever death is mentioned as a cause for compensation under this act, it shall mean only death resulting from such violence and its resultant effects, and occurring within three hundred weeks after the accident.

Section 396. The following schedule of compensation is hereby established for injuries resulting in total disability:

(*A*) For the first five hundred weeks after the tenth day of total disability, sixty percentum of the wages of the injured employee as defined in Section 309, but the compensation shall not be more than twelve dollars per week nor less than six dollars per week, and shall not exceed in the aggregate the sum of five thousand dollars. *Provided*, That if at the time of the injury the employee receives wages of less than six dollars per week, then he shall receive the full amount of such wages per week as compensation. Nothing in this clause shall require the payment of compensation after disability shall cease. Should partial disability be followed by total disability, the period of five hundred weeks mentioned in this clause of this section shall be reduced by the number of weeks during which compensation was paid for such partial disability.

(*B*) For disability partial in character (except the particular cases mentioned in clause (C), sixty percentum of the difference between the wages of the injured employee, as defined in Section 309, and the earning power of the employee thereafter, but such compensation shall not be more than twelve dollars per week. This compensation shall be paid during the period of such partial disability, not, however, beyond three hundred weeks after the tenth day of such partial disability. Should total disability be followed by partial disability, the period of three hundred weeks mentioned in this clause shall be reduced by the number of weeks during which compensation was paid for such total disability.

(*C*) For all disability resulting from permanent injuries of the following classes the compensation shall be exclusively as follows:

For the loss of a hand, sixty percentum of wages during one hundred and seventy-five weeks.

For the loss of an arm, sixty percentum of the wages during two hundred and fifteen weeks.

For the loss of a foot, sixty percentum of wages during one hundred and fifty weeks.

For the loss of a leg, sixty percentum of wages during two hundred and fifteen weeks.

For the loss of an eye, sixty percentum of wages during one hundred and twenty-five weeks.

For the loss of any two of such members, not constituting total disability, sixty percentum of wages during the aggregate of the period specified, for each.

Unless the board shall otherwise determine the loss of both hands or both arms or both feet or both legs or both eyes shall constitute total disability, to be compensated according to the provisions of clause (A).

Amputation between the elbow and the wrist shall be considered as the equivalent of the loss of the hand, and amputation between the knee and ankle shall be considered as the equivalent of the loss of a foot. Amputation at or above the elbow shall be considered as the loss of an arm, and amputation at or above the knee shall be considered as the loss of a leg. Permanent loss of the use of a hand, arm, foot, leg or eye shall be considered as the equivalent of the loss of such hand, arm, foot, leg or eye.

(*D*) No compensation shall be allowed for the first ten days after disability begins, except as hereinafter provided in clause (E) of this section.

(*E*) During the first thirty days after disability begins the employer shall furnish reasonable surgical and medical services, medicines and supplies, as and when needed, unless the employee refuses to allow them to be furnished by the employer. The cost of such services, medicines and supplies shall not exceed one hundred dollars. If the employer shall, upon application made to him, refuse to furnish such services, medicines and supplies the employee may procure the same, and shall receive from the employer the reasonable cost thereof within the above limitations. In addition to the above services, medicines and supplies, hospital

treatment, services and supplies shall be furnished by the employer for the said period of thirty days. The cost for such hospital treatment, services and supplies shall not in any case exceed the prevailing charge in the hospital for like services to other individuals. If the employee shall refuse reasonable surgical, medical and hospital services, medicines and supplies, tendered to him by his employer, he shall forfeit all right to compensation for any injury or any increase in his incapacity shown to have resulted from such refusal.

(*F*) Should the employee die as a result of the injury the period during which compensation shall be payable to his dependents, under Section 307 of this article, shall be reduced by the period during which compensation was paid to him in his lifetime, under this section of this article. No reduction shall be made for the amount which may have been paid for medical and hospital services and medicines, nor for the expenses of the last sickness and burial. Should the employee die from some other cause than the injury the liability for compensation shall cease.

Section 307. In case of death compensation shall be computed and distributed to the widow, widower, children, father, mother, sisters and brothers.

Section 311. Unless the employer shall have actual knowledge of the occurrence of the injury, or unless the employee or someone in his behalf, or some of the dependents or someone in their behalf, shall give notice thereof to the employer within fourteen days after the accident, no compensation shall be due until such notice be given or knowledge obtained.

Section 314. At any time after an injury the employee, if so requested by his employer, must submit himself for examination, at some reasonable time and place, to a physician or physicians legally authorized to practice under the laws of such place, who shall be selected and paid by the employer. The employee shall be entitled to have a physician or physicians of his own selection, to be paid for by him, participate in any examination requested by his employer or ordered by the Board.

Section 410. If, after any accident, the employer and the

employee or his dependents, concerned in any accident, shall fail to agree upon the facts thereof and the compensation due under this act, the employee or his dependents may present a claim for compensation to the Board.

Supplement. Section 1. That nothing contained in any article or any section of an act, entitled the Workmen's Compensation Act of 1915, shall apply to or in any way affect any person who at the time of injury is engaged in domestic service or agriculture.

APRIL 16

Principles of Compulsory Health Insurance

BY HENRY D. JUMP, M.D.

Compulsory health insurance is a plan offered for the compulsory insurance of certain classes of wage-earners against sickness, death and loss of wages. The agitation for such legislation was originated by the American Association for Labor Legislation, which claims that sickness insurance is a natural outgrowth and development of workmen's compensation for accidents.

The chief points upon which they base their contention that such legislation is called for will be mentioned and an endeavor will be made to elaborate these from another point of view:

1. "Industrial workers fall sick more frequently than others because the industrial environment is more or less prejudicial to health and they are subject to unhealthful housing conditions on account of financial disability."

It is claimed that an average of seven to nine days is lost by each worker in a year and that of the 30,000,000 workers in this country 3,000,000 are sick at one time.

It is difficult to determine what proportion of illness is dependent upon industry; some advocates of this legislation have stated that but a small percentage may be directly traceable to such,

and a judicial investigation would probably show that the latter statement is true, for this is the opinion of many physicians whose work lies among manual workers. It is a fact that much illness is due to drunkenness and other personal vices, which, of course, have no relation to the workman's employment.

If housing conditions are responsible for sickness the remedy lies in correction of the cause rather than the result. There are laws to remedy such conditions and enforcement of these would greatly lessen sickness incidence. To insure against illness due to housing is surely beginning at the wrong end. Accidents are in most instances due to the industry and are properly chargeable to the cost of production; but unless sickness is due to industry it cannot rightly be charged to it, and to do so is economically wrong.

2. "Savings are used up for living expenses and medical treatment and recourse must be had to relief societies, friends, unions, borrowing and charitable organizations. Sickness is therefore the cause of a large percentage of poverty."

That sickness may lead to poverty is true, but not to a large extent. Statistics from the Labor Bureau of New York State show that 5.7 per cent. of unemployment is due to sickness, about twice this to labor disputes and thirteen times this to lack of work. If a living wage were paid to all, the sick poor would be able to meet the obligations which sickness causes.

3. "Sickness has not diminished under present conditions."

This statement is contrary to the facts, as is evidenced by the statistics of Philadelphia. These show a diminution in the death-rate in twenty years from 19.3 per 1000 to 14.5 and the tuberculosis death-rate from 221 per 100,000 to 144. Similar figures are found in other American cities. This improvement is due to the efficacy of preventive measures and improved methods of treatment, such as the use of antitoxin for diphtheria.

4. "Present medical care is inadequate."

This may be true, but there are available, for those unable to pay, hospital and dispensary treatment which in most instances is first-class. The average poor person may avail himself of the

personal attention of a physician without charge if the physician is convinced that he is worthy. The charitable instincts of physicians still prevail. In considering the adequacy of medical service one must always bear in mind the disinclination of some sick people to seek medical care when needed. Self-medication or none is too often the practice. Advocates of compulsory health insurance have said that this plan would eliminate the element of charity; but when one considers that the insured is to pay only about 40 per cent of the rate it must be admitted that the other 60 per cent is charity. According to reports from Germany and Great Britain medical care under insurance has become no more adequate than formerly. In some instances it could not be less satisfactory than it is now. W. A. Brend, in *Health and State*, says, in regard to medical care in Great Britain under the National Insurance Act, "Medical service is no better than that which preceded it." Under the insurance plan medical service will be contracted for, and in this country contract and lodge practice have been almost uniformly unsatisfactory and inadequate. This is so because the medical service is contracted for at a rate lower than that which prevails in private work. Hurried and impersonal attention follows, for with the pay fixed there is lost that impetus to good work—the satisfaction of the patient.

5. "Under such a plan morbid statistics may be gathered more easily and preventive measures instituted more readily."

There is no evidence coming from countries in which compulsory insurance operates that valuable statistics have been gathered or that notable preventive measures have been instituted. Sir Arthur Newsholm says the National Insurance Act has not been marked by its preventive value. England's preventive measures were as vigorous before this act was passed as since then. In this country the present methods of state and municipal health administration and education have accomplished much.

The responsibility for sickness is placed upon the individual, the employer and the state. To provide the funds the workman is assessed part of the expense, because, as has been naïvely said,

he is to some degree responsible, and then, too, he is the one who gets the benefits. The employer contributes because illness is to a certain extent due to the occupation, and this could be prevented if care were taken to provide healthful and safe surroundings. The state contributes because prevention of illness is a charge upon the state, and it is responsible for the protection of the people from impure water, milk and other food supplies. In other words, it is sought to enlarge the paternalistic functions of the state.

The insurance is made compulsory because it is claimed that employees would not go into the plan voluntarily. The cost is spread over all employees, the righteous and the unrighteous, the virtuous and the vicious, the moral and the immoral. The thrifty and industrious man must help to take care of the shiftless and the lazy. While all men may be created free and equal, they do not stay so, because the individual efforts of some soon carry them forward. To attempt by communism to keep all on the same level is a practical impossibility.

It is claimed by the advocates of this plan that sickness is properly insurable. At the outset, however, there is violated one of the first principles of insurance—that all insured must start out in good physical condition and pay according to age. Under this all are insured without physical examination and pay into the fund a certain percentage of their wages. Ultimately the physically unsound or sickly may be eliminated, for the employer will realize that such employees will increase the incidence of sickness in his plant and increase his charges. This probably opens up the need for the next step, "disability insurance."

While one may admit that the care of the sick poor is not all it should be, and that the lot of the sick workman is not a happy one, no form of health insurance yet proposed offers the relief which is needed. It is proposed to institute a new, cumbersome and expensive piece of machinery instead of developing to more efficient lines the present measures for the prevention of illness carried on by state and city bureaus of health and enlarging the

existing agencies for the care of the sick. Theoretically the scheme is plausible, but when it is viewed in its practical operation in the countries where it prevails it does not successfully solve the problem.

Compulsory Health Insurance

JOHN H. W. RHINE, M.D.

The question of compulsory health insurance is a broad sociological and economic problem in which the medical profession has been especially interested, as it will be called upon to furnish medical care for compensation which is less than the smallest average fee now prevalent. There are broad principles involved in this scheme which are outside of the medical phases and which have to do with the economic problems in the industrial world. It has been stated that among the advantages of compulsory health insurance are those that it will prevent illness, that it will cure the sick wage-earner and that it will afford financial relief during the period of illness of the worker.

As to the first point, namely, the prevention of sickness, if we examine the experience with compulsory health insurance in countries in which it has been in operation the indications are that it does not do this. As a matter of fact the average number of days lost on account of sickness has steadily increased materially under this system. For example the average number of days lost on account of sickness increased in Germany from about six in 1885, the year sickness insurance went into effect, to over nine in 1915. A somewhat similar experience was observed in Austria. This, of course, may be due either to actual increase in sick days, to malingering, or to wrongful absence from work. This tendency is well recognized in the countries in which compulsory health insurance is in operation, that is, the tendency to malinger or to take advantage of the benefits which the law provides. I look upon this as a serious criticism of the plan suggested.

The second consideration is the cure of sickness. It is planned that this is to be brought about by engaging doctors who are willing to do this sort of work at a small recompense. The result must inevitably be the same as it has been in the countries in which this type of law exists, and that is to lower the standards of the medical practice. Examinations will be short and superficial and careful methods of diagnosis will be neglected. The effect of this sort of practice upon the medical man is to lower his medical standards. Medical care will become more or less perfunctory, and, as a matter of fact, the sick under these conditions will be improperly cared for. It has been shown that the medical practice in England has deteriorated under this system, for a study of the subject shows that the time given to each patient by the physicians is three and a quarter minutes, of which one and a quarter minutes is given over to writing a prescription. This seems to me probably the most serious objection to the plan, and surely one of its objects will thus be certainly defeated.

The third point, namely, the financial relief to the worker, is the strongest argument in favor of the bill. Questions which arise in this relation are really not medical. If the relief comes from financial contributions outside of those made by the insured, that is, from the employer and from the state, the argument has been advanced, and in my opinion rightly so, that the financial aid takes on the character of a charity. If this be true, and I believe it is, the effect upon the morale of the individual must be taken into consideration. Under the proposed plan the state and the employer must pay a portion of the contributions to the funds from which the financial relief is made. This imposes a burden on society in general, as inevitably the employer will increase the price of his commodities to make up for the amount which he contributes. This the general public will pay for. On the other hand the money contributed by the state must be paid for by the taxpayers. The question, therefore, is a very broad one, involving the interests of the general public, the heads of industries and the medical profession.

A number of labor organizations are in favor of it, though Mr.

Gompers himself is opposed to it on the ground that there would be a general weakening of independence of spirit and virility of the worker occasioned. The Massachusetts Commission has reported adversely and the New Jersey Commission favorably, and the bill was not passed in one of the houses in New York State.

The medical profession in general in New York condemns compulsory health insurance. The Committee on Health of the New York State Federation of Labor places health insurance in the class of charity and calls attention to the fact that the unemployed, the aged, the widows, the orphans and the chronically ill are not provided for.

I believe that we must eliminate in this question any consideration that the plan will result in the improvement of health or the prevention of disease. A study of this question shows that a large percentage of cases of poverty occasioned by sickness could not be in any way influenced by compulsory health insurance, and one study of the subject shows that it will not prevent as much as one-fourth of the cases of dependency on charitable agencies for material relief.

Whalen brings forth a very strong argument against this law when he calls attention to the fact that this form of insurance would not decrease poverty, but, as a matter of fact, would increase it by creating a larger dependent class springing from those who would not be able to obtain work because the employer will insist upon choosing only those to work for him who are physically fit. Another difficulty would be in deciding when the man was able to go back to work. As Frederick Hoffman points out, there is no constant relation between sickness and capacity for work, and this would offer many opportunities for fraud and malingering. It really puts a premium on sickness instead of preventing sickness.

Ochsner shows how in contract practice half the calls made by doctors are unnecessary. It is true in contract practice as well as in lodge practice that the services of the medical men are underpaid, and they are overworked.

There is no doubt that there is a need of financial relief by the wage-earner during his period of loss of earning power due to sickness. I feel, however, that the relief should be supplied along the lines of general treatment of health problems, in the improvement of conditions under which the individual works, the hours of work, and national, state and municipal measures for the prevention and cure of disease. It is a question whether this relief could be brought about by the establishing of compulsory health insurance, in my mind.

The enormous expense must be considered in relation to the benefits derived. It has been estimated that the expense in the United States of compulsory health insurance would be $1,000,000,000 or more, an amount which exceeds by one-fourth the total expenditure in the United States for education. If this amount of money were spent in the prevention of disease it would be much better for the community as well as for the individual worker, and would offer a better plan of relief. The possibility of fraud and corruption would arise in the plans which would involve the control of such enormous sums of money.

My own feeling is that the disadvantages of this system are so great as to outweigh the advantages which might accrue to the individual as far as financial relief is concerned. Unless I am incorrectly informed the relief would be afforded only to about 20 per cent of the workers when we eliminate the large percentage of well-paid workers who really do not need this form of insurance. The enormous expense when the relief is afforded to a comparatively small portion of the workers is, in my mind, a serious objection.

Finally, I believe that the inefficient care that must result for the reasons above given will have the tendency not only to increase the sick days but to prolong the periods of illness, and I must emphasize once more, before closing, the tendency to malingering and wrongful absence from work which would be bound to develop under these conditions.

Objections to Compulsory Health Insurance

BY GORDON J. SAXON, M.D.

Compulsory health insurance is a misnomer for a condition of affairs which in reality is a true form of taxation in which the taxed individual pays one-third, the employer pays one-third and the state pays one-third. It is certain that the employee will pay his third. We also know that the employer's third will be added to the cost of production and that the employee will pay a portion of this third, and it is also questionable if a portion of the third the state is supposed to pay will not eventually revert to the so-called insured or taxable individual for ultimate payment.

Compulsory health insurance is a piece of political machinery, having had its inception in Germany. Here it was the product of Bismarck's mind and was designed primarily to overcome the socialistic tendencies of the day and to further the propensities of the imperialistic mailed fist. Its results in Germany have been definitely and undeniably in favor of imperialism. One phase of the situation, however, Germany did not see. She did not see that soon she was to become saddled with an ever-increasing expense which constituted an incubus and placed her in a delicate position with her competitors on the continent, who were not handicapped with such a cumbersome and expensive piece of imperialistic legislation. It therefore rapidly became Germany's intensive effort to energetically prosecute a campaign of propaganda to encourage her competitors to adopt the same scheme. Now in this Germany has been successful; in fact so successful that there scarcely remains any European country today which does not have this impediment upon its progress. England has been the last victim, and it was thought that as soon as the war was over England's national deficit would decrease. Instead of this, however, this recently enacted legislation, probably the most complicated of all of England's laws, has been definitely responsible in that country for an ever-increasing national deficit. I

have said that in Germany it fostered the interests and the activities of the imperialistic mailed fist. Has it done more than this? Let us look at a report from Germany comparing the cost of insurance of the years 1911 and 1901. In 1911 the German sickness societies spent more than twice as much as in 1901, although the number of members increased only one-third. Apparently, therefore, it has not accomplished in Germany what its proponents claim it will accomplish in our country.

What is compulsory health insurance supposed to accomplish in our country? We are told that the wage-earner loses nine days every year through sickness and that the average wage, which has been but no longer is, $2 per day, and that the number of wage-earners is about 33,000,000. We are further told that the economic loss incident to the total illness of the 33,000,000 reaches the alarming total of $600,000,000. Again we are told that the purpose of the law is to save to the general cosmic plan of things this $600,000,000. In other words, it is going to restore to the employee his lost $600,000,000 and thus have a general bearing on our total social economy. Now we are furthermore told that the plan of the American Association for Labor Legislation provides that the first three days of illness shall not be covered. So we see the nine days' loss becomes a six days' prospect, but the American Association for Labor Legislation states that the indemnity shall be but two-thirds of the loss. So the six days' prospect shrinks to a four days' indemnity. That brings it down to an $8 indemnity against an $18 loss; but the process of subtraction does not end here, for the plan of the American Association for Labor Legislation provides that the employee shall contribute 40 per cent of the whole cost. So again the $8 indemnity shrinks to an actual eventuality of $4.80. We therefore see that while we started with an admitted loss of $600,000,000 we have saved to him merely $150,000,000 and have spent the $450,000,000 in the operation and manipulation of a totally clumsy and cumbersome piece of machinery.

Proponents of compulsory health insurance have made the charge against the medical profession that they are attempting

to block legislation designed to conserve the health of the people; that they are doing this unmindful of the benefits that might accrue to the great majority of the people simply because it works a hardship on the medical profession, which represents an exceedingly small proportion of the population.

They further charge that the medical profession has not offered anything constructive. Nothing could be more unjust or more untrue than such an accusation.

Medical men have always aided in any measure that is conducive to better health. They have been ardent advocates, for instance, of vaccination, a measure which has enormously curtailed the income of the individual physician, and yet it is through him that vaccination in most states has become compulsory. The income that a physician would derive from one case of smallpox alone would be considerably more than he now derives from vaccination throughout the course of an entire year.

Water filtration is not a product of the engineer, nor of the professional drafter of legislation, nor of the social worker or politician. It is the direct product of medical achievement, and in Philadelphia and elsewhere has been fostered by medical organizations and by physicians individually.

Twenty years ago in the city of Philadelphia there was scarcely a physician, who was at all active in practice, that did not have anywhere from five to twenty cases of typhoid fever, deriving therefrom a considerable portion of his income, and yet it has been largely through his own efforts that this source of income has been removed.

In the distribution of food I doubt very much if the public realizes the influence that has been exerted by the doctor. It is not so long since, and well within the memory of everybody present, that milk was distributed from a milk can from door to door, and the purveyor, with mittens covered with stable dirt, reinoculated his product from door to door; but today it is delivered in milk bottles and is a comparatively safe food. The standards set for milk distribution are maintained in Philadelphia by the Philadelphia Pediatric Society.

Our boards of health are industriously engaged in campaigns against dust and flies and for proper food inspection and the proper regulation of refrigeration facilities. International commerce has benefited by the activities of medical men. An instance of this is seen in the construction of the Panama Canal. DeLesseps did not fail because of lack of funds nor because of lack of engineering ability. His project was liberally financed, and he himself had already constructed the Suez Canal. It remained for the sanitary expert to police the Canal Zone and rid it of malaria, yellow fever and other tropical plagues. The Panama Canal is the achievement of the sanitation expert essentially. The physician's activities have been largely responsible in all lines of municipal sanitation—cleaner streets, abolishment of surface drainage, rigid quarantine laws, free distribution of vaccines, antitoxins, etc.; also free administration of these if it is desired, free examination of school children, free care of persons with contagious or other diseases, and many other factors, too numerous to mention, which have proved their worth in the conservation of health.

In practically all of the medical propaganda within these lines for social betterment the medical man has been largely concerned, has received the support of the profession as a whole and has done it without pay. Another achievement of organized activities from the same source is most of the provisions for state and national sanitation. These include purification of the water supply; prevention of water contamination; sewage disposal; state free-care of the tuberculous, for tuberculosis is a preventable and arrestable disease; free medical service to all who apply; and diagnostic facilities from the state board of health laboratories. In respect to sewage disposal and water polution it is safe to say that if the laws already in existence for the regulation of these things were to be rigidly enforced and a small portion of a compulsory health insurance budget be appropriated to such an end the curtailment of disease would be as striking as it has been under the influence of water filtration.

If the American Association for Labor Legislation were to concentrate on a plan to nationalize curfew for the children of our

country their efforts would be rewarded by results which would be spelled by reduction of prostitution, reduction of venereal diseases, reduction in amount of cigarette-smoking, the production of a sturdier race and the establishment of a race definitely resistant to all of the diseases of childhood and such plagues as tuberculosis.

If any portion of the compulsory health insurance budget were annually appropriated to the project of a more universal water filtration and to more perfect plans of sewage disposal a step will again have been taken in the right direction to prevent disease, to reduce economic losses due to sickness and loss of labor and naturally to reduce poverty.

We do not need more laws. We need more rigid enforcement of those we already have. Right here, as both a state and a national provision, let me add that the enforcement of legislation regarding profiteering and gouging would enable the public to be better clothed, better housed, more properly fed and to be definitely more healthful. All these are mentioned to show that the physician has not been unmindful of the public good, and that insofar as preventive medicine is concerned he has never obstructed legislation nor health provisions that would prove themselves worthy. Therefore his opposition to compulsory health insurance is not due to financial considerations, but due to an unprejudiced belief and a knowledge born of liberal experience that compulsory health insurance will not accomplish what its proponents claim.

In conclusion let me state that compulsory health insurance is not remedial, since it does not correct existing conditions nor does it supply an existing need. It imposes a liability where neither liability nor duty existed. It imposes dependence and places one subject to the wishes of the state whether such wishes coincide with those of the recipient. It has not reduced the incidents to illness nor poverty in countries in which it has been given a fair trial. It has been known in Germany and other countries to have increased malingering, since it enables one who is indisposed as a result of a debauch or other indiscretion to feign

illness from natural consequences, to receive treatment as a matter of course together with a beneficiary stipend.

Its advocates liken it unto the Workmen's Compensation Act, a piece of legislation which is remedial, which has partially supplied an existing need and is established on a firm economic basis, none of which qualifications are possessed by compulsory health insurance.

Conclusion. More corrective, more remedial and more logical would be the investment annually of one-quarter of the amount necessary for a compulsory health insurance budget toward corrective measures directed to community and municipal sanitation; state sanitation; the establishment of a Federal department of health; Federal exclusion of undesirables; Federal supervision of interstate water supplies and of sewage disposal; the improvement of districts infested with malaria and similar plagues; a municipal, a state, an interstate and a Federal movement directed against the ravages of tuberculosis and cancer; common-school education; full hours in school; an ample number of teachers amply paid; community school meetings, and community health meetings for parents. Why is the public learning the beneficial influences of bathing, proper selection of food, proper hours of rest, proper and correct methods of working, correct clothing, proper sex relations, ample ventilation, isolation of the sick, curfew and a thousand and one other things? They have learned these because the medical profession unaided, without any financial budget, by personal instruction, involving their own time, has enlightened the public on these points and is continuing so to do.

Finally the physician's duty in respect to this proposed legislation is to get enthusiastic, get twenty-five others enthusiastic, and get each of these to set twenty-five others thinking, organize, put up some money, fight hard and cripple the proposition now, for this scheme is not an institution for true Americans. Millions have come to our shores to avoid it, and if we exert any effort at all we will be able to thank God that it never will become an American institution.

Compulsory Health Insurance as a Sociologic Question

BY HENRY LEFFMANN, M.D.

It has been said, epigrammatically, that government is an evil established to avoid a greater evil, that is, anarchy. The signers of the Declaration of Independence asserted formally that governments derive their just powers from the consent of the governed, and then further declared themselves absolved from a government which had in their opinion exercised unjust powers.

The tendency of government seems to be in all ages and conditions of men to a steady limitation of the powers of the individual and the absorption of these powers by the state. Many so-called civilizations have arisen and disappeared within the bounds of known history, but the course of events has always been essentially the same. At first a coöperation of all or most of the tribe or clan, then a translation of power to a chosen few. We can trace the evolution perhaps as vividly in the Bible as in any record. From the time when Abraham addressed the sons of Heth assembled to bargain with him for the purchase of a grave to the despotism of the period of David and Solomon, we can see how all systems of *laisser faire* contain within themselves the seeds of their own destruction. It is not even necessary to turn to ancient history to perceive the principle. Within the memory of many now living the suppression of individualism and the extension of state control have been marked. Compare the attitude and powers of the general government in the War of Secession and in the late World War. It would have been impossible in 1861 to suppress the identity of the several state regiments; it would have been impossible for the general government to do many things that it did lately without protest and even with approval. The Federal Food Law, passed about a dozen years ago, would have been met in Washington's day, and probably in that of Lincoln, with a storm of protest that it was an intrusion on the rights of the states and an interference with the freedom of contract.

It behooves us, therefore, in considering the question under discussion, not to be misled by appeals to so-called "personal liberty," "individual initiative" or to the shibboleth that was so popular in England during the ascendency of the Manchester School, the "enlightened self-interest" of corporations and individual employers.

Modern civilization is dominantly industrial and the industries are dominantly productive of disease and injury. It is not necessary to set forth here to any extent the statistics that have been collected by the several official bodies showing the deaths and injuries that have resulted from labor in the principal industries in this country, especially in mining and quarrying and in the operation of the transportation system. It must be remembered that these figures refer almost entirely to injuries, fatal or non-fatal, and take no account of the incapacitation by disease, either acute or chronic.

As an illustration of the danger of an industry I will quote a few figures just published by the Bureau of Mines. The coal-mining industry of this country employs about 760,000 men who work about five-sixths of the working days of the year. In 1918 the total fatalities were 2576. The non-fatal injuries are not given, but taking the Pennsylvania statistics as a guide it may be assumed that the non-fatal injuries were about three times those of the fatal ones. This takes no account of diseases and debilitation. In Pennsylvania in 1916 the fatal accidents left 631 widows and 1510 orphans.

The remedy that has so far been put in general operation for the relief of those affected by unfavorable conditions and perils of work has been charity, either by state operation or private impulse. The poor laws of all the great countries have been subjects of discussion for centuries and have always been found unsatisfactory and insufficient for real relief. Private organizations established by well-to-do citizens are operative in all civilized countries, and in addition many organizations established by the voluntary action of those who are to be the beneficiaries, such as lodges, insurance companies and brotherhoods. There has been

on the part of the well-to-do class a tendency to what has been called by a French critic, who wrote a most interesting book on the sociologic novel in England, the *Philosophy of Christmas*. The wealthy must at stated intervals give of their store. This method is a favorite one with the bourgeois section of society, but it offers no solution of the problem of poverty and incapacitation.

> It will but skim and film the ulcerous place
> While rank corruption, mining all within,
> Infects unseen.

Reckless charity, that is, the giving of money, food, clothing or shelter upon the mere application for it, with the presentation of the so-called "hard-luck story," has been a fertile source of demoralization of the lower classes. The liberal distribution of alms from the religious houses of medieval times was an example of this fact. In the modern administration of private charity an effort has been made to sift the deserving from the undeserving, and this has found expression in the well-known societies for organizing charitable relief. Undoubtedly much good has been done by this method, but it seems expensive and involves energetic solicitation among the better class, which often becomes irksome and provokes criticism, while there is always some uncertainty as to whether the yield in a given time will suffice for the needs of the organization. Inasmuch as assistance is usually given only after study of the case the method has been severely criticised by some sociologists and termed "charity carefully iced."

A more serious phase of the voluntary support of the sick and injured is the conditions that have grown up in many states of this Union of extending liberal appropriations to hospitals and charities by the legislatures. Beginning in a small way many years ago the state of Pennsylvania, for instance, has become a distributor of largess in a most reckless manner, and there is no reasonable doubt that gross corruption has marked many of these actions.

Further, all these methods have the demerit that they are charities, either directly or indirectly, and as such demoralizing

to the beneficiary. It must be borne in mind that death, injury and disease have a serious influence upon the output of labor. Under the conditions of the world today productivity must be kept up to a high point. The civilized world is living high. The condition may be admitted, but tears will not remedy nor sermons reform it. Unless the larger industries are kept going at high pressure the mass of the people will suffer. Actual starvation of a large portion of the community is not at all beyond the bounds of possibility in the event of failure of certain industries.

The remedy seems to me to be the establishment by the government of a system of health insurance by which the incapacitated persons can be taken care of properly and restored, when such is possible, to earning power. Personally I favor national and not state organization. I have no faith in the state-rights fetish and have elsewhere given my reasons for abandoning it in every application.

Some of the advantages of an official (and national) system of health insurance as against private enterprise have been set forth in a pamphlet by Warren and Sydenstricker, of the Public Health Service, from which I take the liberty to quote:

"The democratic character of an effective health insurance is most pronounced in a governmental system. The wage-earner has a real basis for the feeling that the benefits he receives place him under no obligation to any particular rich man of his community. All taint of dole or charity is avoided. Since the public is represented in support and control, and largely in the administration, the danger of the system becoming a source of quarrel between employers and employed is lessened. Certain features that are objectionable in private plans, for instance, compulsory membership, are avoided in the governmental system."

It is claimed there is a higher degree of efficiency and less operative cost than with private systems. This is likely to be received with a smile by present-day Americans who have a knowledge of government methods, but we must not overlook the frauds and mismanagements that have occurred with some of the private organizations for relief, especially the assessment

and mutual companies. It is known, also, that the profits of most of the non-mutual insurance companies are very large.

In public insurance the necessity for maintaining large reserves, providing for dividends, paying high salaries to officers, commissions to solicitors and general duplication of overhead expenses are avoided.

The more influential workmen's associations, such as the American Federation of Labor, are opposed to compulsory governmental insurance, the chief allegation being that the wage-rate should be such as to enable the laborer to provide for his own incapacity. The answer to this is that wide and long experience shows that the mass of wage-workers will not make such provision. The present conditions are a demonstration of the fact. Never in the history of the nation has the general level of wages for the proletarian been so high, but there is no evidence that any considerable proportion is preparing for a rainy day. The financial reports show that the retail trade has a volume greater than ever known, and it is matter of common knowledge that this trade is largely in luxuries, such as jewelry, excessively fine clothing, automobiles and general high living.

The voice of history is that the mass of the community cannot take care of itself. *Vox populi* is not and never has been *vox Dei*. It becomes the duty of those who are in control of the policy of the state to take care of the mass of the community and to protect them against themselves. Civilization has been defined to be an equal cultivation of the head and heart, but perhaps the epigrammatic definition by Professor Ely is the best, namely, that civilization is regard for the future. It is in the sense of the latter phrase that the question of compulsory health insurance should be considered. To the charge that is so often brought against it and similar nationalization movements that it is "un-American," the answers may be both specific and general. In the general aspect the statement may be confidently made that the existence of the United States is due to a suppression of individualism which began when the "glittering and sounding generalities of natural rights" of the Declaration were abandoned for the collective

methods of the Constitution, and the evolution has proceeded with some irregularity but with no substantial retrograde since that time. Speaking specifically it may be said that practically all the main principles of health insurance have been long recognized in the United States and have not been regarded as "un-American." Health insurance for the purpose of distributing the cost of illness and the compulsory principle that all the members of a certain group must contribute to a sick benefit fund are quite familiar. Participation in such work is now established in connection with the cost of administering the compensation laws.

Taxation by the Federal government for the benefit of its employed has been in operation for over a century in the maintenance of marine hospitals. As early as July 16, 1798, a law was passed levying a tax of twenty cents per month on every person employed on the merchant vessels of the United States. The fund so created was used for the relief of sick and disabled seamen. After some changes the plan was finally established as a tonnage tax, from the yield of which practically every person who goes down to the sea in ships benefits.

The problem is complex and there are many points of difficulty and danger; but the data are at hand in great numbers, covering a wide variety of times and places, and success will be attained by a cool, critical study of the material at hand and the scientific application of well-established sociologic data.

OCTOBER 15

The Interpretative Value of the X-ray in Certain Phases of Industrial Medicine

BY G. C. BIRD, M.D.

The diagnostic value of the *x*-ray in industrial medicine is becoming more and more apparent every day, and yet it is safe

to say that it is not employed in more than half the cases in which it is indicated.

Industrial medicine in this country has come to stay. When we look about us and see what it is doing for the employed as well as the employer, and when we compare the sanitary conditions of our factories and offices with the conditions that obtained a few years ago, when we see how carefully the workingman is examined for physical fitness before being employed and how his interests are safeguarded after employment, we realize that industrial medicine is one of the greatest strides made by our profession in recent years.

I do not believe that it is entirely due to the passage of the Workman's Compensation Law that industrial medicine has become so important, but I believe that manufacturers and those who employ large numbers of trained workers have come to a realization that their own success depends upon the efficiency of every man and woman in their employ, and that they owe it to these employees to conserve their health and make their surroundings as sanitary as possible.

I will classify the value of the *x*-ray in industrial medicine under three headings:

1. As an aid in determining the physical fitness of an applicant at the time of employment.

2. Its value in the diagnosis of certain injuries and diseased conditions occurring during the time of employment, and

3. Its value in protecting the employer, and in turn the insurance company back of the employer, against fraudulent claims of accident disability.

Many industrial firms have instituted welfare departments under the charge of medical men. In these departments applicants for employment are carefully examined to determine their physical and mental adaptability to the work required. I have been informed by the welfare superintendent of one of our large manufacturing plants that it costs his firm about eighty dollars to break in each new employee. This amount is figured on a basis of time and material wasted while the employee is being trained for his

particular work. It is evident, therefore, that the prospective employee should undergo a careful physical examination before being definitely employed. Here we come to the first use of the *x*-ray in industrial medicine, to assist in determining the fitness of an employee for the position he is to fill.

An applicant for a situation who finds that he has to undergo a physical examination is in the same category as the applicant for life insurance, in that he is going to try to appear at his best and conceal his physical defects. The welfare physicain has to depend very largely upon objective symptoms, and in some doubtful cases an *x*-ray examination will decide whether the applicant is worth spending money on in the hope of making him a valuable employee, or whether he is likely to prove a loss through physical disability. Among some of the conditions which would make employment of an applicant inadvisable, and which might be overlooked without an *x*-ray examination, we might mention the following: Incipient pulmonary tuberculosis, thoracic aneurysm, mediastinal gumma, chronic abscesses at the roots of teeth, renal and vesical calculi, badly united old fractures, different forms of arthritis, bone diseases and abnormalities of the feet. Even if an applicant is given employment in spite of the fact that he has some physical disability, it is a protection to the employer to have a record showing that this defect existed and was recognized at the time of employment.

The second and by far the more common use of the *x*-ray in industrial medicine is in behalf of the employee who is injured while in the performance of his work, or who as the result of disease is losing time and falling behind in the proper performance of his work.

One large corporation in this city, employing many thousands of employees, has a splendidly equipped medical department with a staff of physicians and nurses constantly on duty. The heads of different departments coöperate with the medical department in sending for examination any employee who appears to be laboring under any physical defect. Any employee may have the benefit of a thorough physical examination at any time that it

seems advisable. If necessary, they are referred for *x*-ray examination, or to an ophthalmologist; in short, they are given the best that modern medicine has to offer. After all of the diagnostic data is collected it is turned over to the family physician of the employee to aid him in treating the case. All this is done without any expense to the employee whatever. In 108 *x*-ray examinations made for this corporation during the current year an analysis of the parts of the body examined is as follows: Chest, 28 cases; complete dental examinations, 23; accessory nasal sinuses, 5; gastro-intestinal, 5; urinary tract, 5. Total, 66 medical cases. The remaining 42 were examinations for fracture or other surgical condition.

I quote these figures to show what I believe to be a growing tendency on the part of industrial physicians to make use of the *x*-ray in medical diagnosis.

In manufacturing concerns and shops the *x*-ray is employed chiefly in the diagnosis of bone injuries and in the localization of metallic foreign bodies. Many firms insist upon a roentgen examination in any injury to the extremities. I believe this is a very wise precaution. Too often, however, an employee is referred for *x*-ray examination at the end of his period of compensation instead of at the beginning, only to find that he has been suffering with a fracture or bone injury all this time without having had appropriate treatment.

Quite a few industrial plants have equipped their dispensaries with *x*-ray apparatus with the thought that their accident cases might be *x*-rayed on their own premises. There is something to be said in favor of such an arrangement and much to be said against it. It must be borne in mind that the value of an *x*-ray examination is in direct proportion to the experience of the one who interprets the negative. It goes without saying that one who has only occasional opportunity to read *x*-ray plates will probably overlook almost as many injuries as he will find.

The third advantage of the *x*-ray in industrial medicine is in the protection of the employer and the insurance company against fraudulent claims for accident. I can recall many instances where

an employee claimed he had hurt been at his work where the *x*-ray findings showed no fracture, but did show the existence of bone syphilis. I believe there is no doubt that compensation insurance companies pay out large sums of money annually for alleged accidents which in reality were cases of bone syphilis.

Only last week I had a case referred for *x*-ray examination of the forearm in which the patient assured me he had fractured his arm while at work. The first-aid man who referred the case had applied a bone splint and the forearm was carefully bandaged. The *x*-ray negative showed no signs of a fracture, but it did show the characteristic knobby hyperplastic appearance of bone syphilis.

Industrial physicians tell me that one of the most frequent complaints met with among employees is that of so-called "sprained back." Almost any kind of a backache is attributed by the employee to some strain, real or fancied, which he sustained while at work. This is a hard condition to disprove, and yet I have had four or five cases where an *x*-ray examination revealed a large renal calculus, which was undoubtedly the cause of reflex pains in the back.

It often happens that a patient is referred for *x*-ray examination of a joint, to determine the cause of lameness which has been attributed to a contusion or a sprain, and I should like to call attention to the possibility of some of these cases being due to focal infections and not to accident. The first industrial case of this kind that came under my notice was that of a man who was suffering so much pain in his hip that he came to my laboratory on crutches. The *x*-ray findings in the hip were absolutely negative. I examined the man's mouth and found his teeth were in such bad condition that I asked permission to make a complete dental examination. The result was that seven large apical abscesses were discovered. There is no doubt in my mind that these were responsiblë for an arthritis which, while it was not apparent in the *x*-ray plates made of the hip at that time, developed quite rapidly later, so that at the end of two or three months there was almost complete destruction of the hip-joint.

Following this case, I have been more watchful in examining

the teeth for focal infections where no definite signs of traumatism are found to account for joint symptoms. It is surprising how many of these so-called injuries recover promptly after extraction of abscessed teeth.

Another condition which we frequently see, and which certainly predisposes an employee to accident, is that of exostosis on various bones, notably the olecranon process of the ulna and the under surface of the os calcis. A man having an exostosis on the tip of the olecranon may easily be entirely incapacitated for work by a simple bump on the tip of the elbow, which lacerates the bursa over the exostosis and produces a very painful and intractable condition. In like manner a man having an exostosis on the under surface of the os calcis may jump from a low elevation of not more than two feet and so lacerate the soft tissues of the heel that total disability may follow. Of course, these bony outgrowths are found in many other locations, but the olecranon process and os calcis seem to be favorite locations, and I have seen very many disabilities caused by slight trauma over such exostoses. It is a question whether an insurance company can evade its responsibility in paying accident claims for such injuries; but, on the other hand, the injury would probably not have happened if these abnormal bone phenomena had not existed.

The insurance companies are becoming more dependent upon the *x*-ray every day to protect them from paying unjust claims.

On the other hand, it often happens that in cases which are *x*-rayed directly for an insurance company, with the expectation that accident will be disproved, the accident claim will be substantiated by the *x*-ray evidence and the matter adjusted on an equitable basis. My experience with industrial insurance companies has convinced me that with very few exceptions they are just as willing to pay just claims as they are unwilling to be imposed upon.

In conclusion I should like to urge the advisability of having doubtful cases *x*-rayed as soon after injury as possible, for there is no doubt that a great deal of useless suffering is entailed on the part of the injured employee and an injustice done to the employer

and insurance company by leaving an *x*-ray examination as a last resort, only to find that the wrong treatment had been carried out through failure to recognize certain injuries which the *x*-ray would have made at once apparent.

Pneumoconiosis

BY HENRY K. PANCOAST, M.D.

Pneumoconiosis is a general term employed in connection with the effects induced in lung structure by prolonged inhalation of abnormal quantities of dust. It is invariably due to inorganic dust. The changes induced by organic dust are probably due to the mixture of inorganic dust. The use of the general term pneumoconiosis is preferable to those words which apply to a particular kind of dust inhaled, as anthracosis (coal dust), siderosis (iron dust), etc.

The roentgenographic examination is the only means of accurately determining the exact condition of the lungs during life, especially as there are few or no clinical evidences of the condition in the early stages.

Pathology. 1. The first effect of excessive dust inhalation is irritation of the air passages amounting to a condition of chronic bronchitis. This causes more or less fibrous change, just as occurs in war gas exposure and acute inflammatory conditions such as pneumonia, whooping-cough, etc. These changes are shown roentgenographically as enlargement of the hilus shadows and thickening of the numerous linear trunk shadows.

2. Following this there is a pigmentation of cells and a deposition of dust particles in the lymphoid and lymphatic structure further out in the lungs in practically the same histological locations in which we find tubercles. There occurs around these areas a localized fibrosis which gradually produces areas of density visible to the eye and gives the characteristic mottled appearance to the lungs.

3. Diffuse fibrosis occurs as a late manifestation of the disease and results in a lack of expansion of the lungs from lessened elasticity, bronchiectasis and emphysema. The diaphragms are unable to move properly because of inelasticity and dyspnea is marked.

Roentgenographic Features. Most writers agree that the condition may be divided roentgenographically into three stages, corresponding to the pathology:

First Stage. This stage is characterized by (*a*) an increase in the hilus shadows; (*b*) a thickening of the normal linear trunk shadows and an undue prominence of the finer linear markings. This is usually uniform, but there are exceptions, and occasionally the appearance is more marked in one or both apices. The appearance in this stage is due mainly to the irritation of the air passages and possibly also to a low-grade inflammatory process in the hilus structure. It is frequently difficult to determine an engrafted tuberculosis, but usually the diagnosis is more readily made in this stage than in the later ones.

Second Stage. This stage is characterized by more or less uniformly arranged mottling throughout the lungs, due to the deposition in the lymphatic and lymphoid structures, and even in the cells, of dust particles. In addition, there is a localized fibrosis around these areas, causing the typical mottled appearance similar to that seen in tuberculosis. This is the typical stage. Fibrosis is probably more concerned in the production of the mottling than the deposition of dust. The rapidity of the process depends on the quality of the dust more than its quantity. Silica is the most active agent, undoubtedly. It occurs comparatively early in coal miners working in the mines, in metal grinders and in hard-rock miners, and later in potters, cement workers and asbestos workers. The distribution is interesting. It appears usually in the right lung, first around the root, and then is distributed equally on both sides later. This stage is very difficult to differentiate from an engrafted tuberculosis, and especially a tuberculous process of the bronchopneumonic or miliary types. The distribution of a greater amount of mottling in the apical regions is practically the only chance of diagnosis.

Third Stage. This stage is characterized by diffuse fibrosis, which is an end-result of the condition. It does not differ materially from the appearance of fibrosis following tuberculosis or other conditions. Early in the stage it will be noted that the mottling of the second stage is becoming conglomerate; but this cannot always be noted, and frequently the general fibrosis begins to appear as a diffuse haze. It does not involve the apices as much as just below these regions. The heart and vessels may be displaced, the diaphragms may be fixed and the rib movements very much restricted. Fibrous bands are frequently seen. It is, of course, very difficult to determine an engrafted tuberculosis in this stage.

At the last meeting of the American Roentgen-ray Society, Dr. Jarvis, of Barre, Vermont, brought out some very interesting points in connection with the findings in pneumoconiosis among the workers in the granite quarries. It was noted by him that mouth-breathers showed the changes less rapidly than nose-breathers. Among the races, the Italians showed the least changes and the Irish the greatest changes. The lack of expansion in the upper right chest and the lower left chest, due to the holding of the rock drill, was regarded as responsible for fewer changes in these two regions. He also noted that during periods of rest the hilus shadows and the peribronchial thickening became less. He also noted, in a number of cases, pleural thickening and pleural effusions, which he ascribed to lymph-block resulting from the fibrosis.

DECEMBER 17

The Promotion of Surgical Efficiency in Hospitals

BY JOHN B. ROBERTS, M.D.

Workmen's compensation acts have increased the evident responsibility of those hospitals which admit for care and treat-

ment persons injured by industrial accident. The moral responsibility existed before compensation laws were enacted. Nevertheless, officers of institutions doubtless feel the pressure of that responsibility more keenly now that business plants are compelled by law to pay for the care of workers injured during hours of employment.

There is little doubt in my mind that the amended compensation law of Pennsylvania, for example, has had a similar effect in increasing surgeons' attention to details, and intensity of supervision of treatment, when industrial patients come under their personal care or enter hospital service. It is much easier to forget to visit or to postpone visiting a wounded man who is not expected to pay a fee than one whose bill for professional treatment is guaranteed by state law and the treasury of a mining company or a successful manufacturer.

One indirect benefit to the community, therefore, will be an improvement in surgical efficiency in dispensary and ward work of hospitals and advancement in the scientific equipment of individual medical men. This gain will be found worth while to the taxpayer, the lawmaker, and the whole medical profession.

An immediate result of industrial pecuniary responsibility to the hospital and to the doctor has been a marked improvement in keeping records of patients. This is shown in steps being taken to have histories of previous injuries and illnesses and the details of treatment and results of the present wounds duly recorded. For years, many hospitals gave so little attention to this matter that information was often not obtainable even in serious cases, subjected to months of treatment, with a reasonable prospect of judicial inquiry into the facts of an accident. I need not say that many, perhaps most, surgeons today have no adequate record system of their private surgical work, so far as description of injury, the outline of treatment, or the condition of the patient at the end of treatment.

The custom in vogue in a large number of metropolitan hospitals exacts unpaid professional work from its surgical staff. This enjoyment of cheap service is destined to be lost by the demand

for greater efficiency than is to be obtained by its continuance. No argument of value justifies the creed that surgeons should give free services to a hospital for its paying patients. The habit of expecting this sacrifice of time, thought and skilled labor without remuneration is a traditional one founded upon the old notion that a hospital was a refuge for injured men who had fallen among thieves and been stripped of their purse and clothing. This idea is formally shown in the official seal of a hospital in Philadelphia.

Passage of time has changed greatly this status of hospitals. Now many persons are permitted to enter the walls of such institutions for free treatment, upon whom the donations of the charitable public are unnecessarily expended. Baltimore became a world center of the highest type of surgical and medical service when the trustees of Johns Hopkins University brought to its hospital staff men of great intellectual and professional promise by paying good annual salaries.

Why should hospital authorities be satisfied with the fag end of a distinguished surgeon's or physician's day. All of us doctors who have lived in close association with hospital administrative affairs know of inadequate service rendered by surgeons and physicians, whose private practice necessarily demands their more instant and attentive professional skill. Men of talent and high repute are to be found who will accept unpaid appointments on hospital staffs and then thrust the real work of their posts year after year on junior assistants. Of what value are such office-holders to hospital efficiency? Better would it be to give short shrift to an unpaid surgeon and appoint a wide-awake incumbent at a reasonable salary.

The abandonment of the fractional term of ward service, so common in the United States, will promote efficiency in the conduct of hospitals used for industrial surgery. By fractional service, I mean that the attending surgeons, and physicians also, serve only two, four or six months in each year; and at the end of these periods patients are transferred to another surgical chief. Under such schedules a serious injury may oblige a patient to

have three or four different surgeons before he is discharged, improved or cured.

The short or fractional term of surgical attendance should be discontinued. A continuous service from year to year under one chief, with junior surgeons trained to continue the records, discipline, methods and scientific efficiency of the particular section of the hospital, will give the most satisfactory institution for treating injured industrial employees. No manufacturing plant is likely to reach the status needed to attain a wide reputation for successful operation and a proved output, if it shifts its department foreman three or four times a year. The continuous term of surgical service need not prevent the employment with salary of a number of chief surgeons. Each one of them, however, should have his own section or ward, manned by subordinates, who should remain long enough to develop into surgeons of discrimination and good judgment. The senior of these understudies should be given good reason to believe that, if proved deserving, he is likely to become a chief surgeon.

The nursing force should be organized in much the same way as the surgical personnel of a ward or section. Frequent changes of nurses in operating room, superintendent's office, or ward service, lead to confusion and bring failure to obtain proper standards of nursing efficiency. The necessity to train novitiates in nursing greatly impairs the progressive development of a hospital, unless care is taken to prevent an undue number of partly trained pupils being put into ward service at one time. Cheap nursing is almost as bad as cheap surgical supervision.

Hospitals desirous of obtaining income from large numbers of compensation patients or private pay patients will find it a good policy to pay the surgical staff and the nursing staff such stipends as will secure an intelligent, well-trained, conscientious and up-to-date personnel. It is probable that it is the short, fractional terms of duty which tempt some surgeons to accept high positions in several hospitals. Careless attention to duty is pretty certain to be developed by this attempt to divide one's devotion between three or four institutions. The hospitals receive half-hearted

service, the patients are too often shifted to a new chief, and the surgeon himself constantly comes against obstacles which cannot be overcome in a few weeks. The result is slovenly work and a divided loyalty.

I published some years ago a protest against the administration of anesthetics by inexperienced hospital assistants. This peril to patients has been considerably lessened in recent years, though it is still a responsibility for further administrative consideration.

A source of inefficient care for the safety of persons brought to the ward for emergencies is the assignment to that duty of inexperienced doctors and nurses. Surgical alertness, trained judgment, and wise treatment are not to be expected from young physicians just graduated from the medical college or in young women still in classes for training nurses.

An accident ward needs the best trained members of the resident medical staff within immediate call, day or night. It needs at least one experienced graduate nurse, who is capable of quick action in medical and surgical emergencies; it needs supplies at hand to deal immediately with shock, hemorrhage, poisoning and impending death. There should also be sufficient muscular aid within call, to be immediately available for ejection of midnight intruders or drunken busybodies.

Improvement in laboratory investigations of disease will probably be needed in some hospitals to make them satisfactory to the business men who are required by law to pay the bills of workmen suffering injury in industrial plants. The advantage of having social service departments instituted in all hospitals will soon be recognized by many more institutions than is the case at the present time. Persons injured through war casualties have been shown to need muscle training, psychological influences, and physiotherapeutic agencies, if complete or nearly complete return to usefulness is to be secured. Apparatus of varied construction will be of much value in this direction, in industrial surgery, especially when used in association with social service or the so-called welfare department of the reconstruction movement. Mental occupation, vocational training, and community

treatment stimulate automatic reactions; and hopeful energy is of great assistance in many forms of ill health after sudden accidental disability.

My final topic of this discussion of defects in medical organization of hospitals is merely a corollary of already mentioned sources of trouble. When the medical chiefs are negligent or inefficient, the executive department is pretty sure to show evidences of want of grasp of the essential duties of a hospital. Trustees, however, soon defer to the medical staff in medical matters, if the members of the staff show energy, loyalty, and progressive, business-like qualifications.

It is when the doctors neglect their professional obligations, permit slack service in their personal assistants, and condone inefficient work in dispensaries, wards and laboratories, that the nursing units assume or are obliged to accept authority belonging properly to the interns, resident physicians, and chiefs. The heads of nurses' training schools, the nurses in charge of the wards, and even the pupil nurses, not only live in the hospital but have a continuous service extending over several years. The unpaid attending surgeons and physicians with fractional terms of duty are at best only occasionally within the hospital walls. The resident physicians and interns, who unfortunately have no prolonged connection with the hospital, reflect the character and manners of their chiefs. It is not unlikely, therefore, that the tone of the wards will gradually reflect the personality of the nursing overseers. Hence it is that in many institutions for the sick and hurt there is too much assumption of medical authority by nurses. This is often seen markedly in the conduct of nurses in private practice after graduation.

To obtain a perfect hospital, cheap medical labor must be given up, fractional terms of service converted into continuous responsibility, medical demeanor and earnestness instilled into the minds of the surgeons and physicians, and interns and the nurses taught that their function is to obey orders and to maintain discipline in the wards. Poor service often arises from neglectful and careless demeanor of medical officials in hospitals.

The medical staff, therefore, is usually the underlying cause of inefficient care of the sick, insubordination in executive departments and defects in nursing.

Dispensary Determination of the Mental Efficiency of the Employee

BY C. A. PATTEN, M.D.

AND

J. H. WEISENBURG, M.D.

The dispensaries of the general hospitals are not much used for the determination of mental efficiency of employees as a class. An analysis of the data from the out-patient neurological services of our hospitals shows that but few cases of men or women come to us for a solution of such a problem. The few that we do see usually give a history of leaving their place of employment because of some mental or physical difficulty, and having failed to find relief through various means are finally brought to us by the Society for Organizing Charities or the social service department for opinion and treatment. It is not unusual to elicit the history that they cannot support themselves or families or take a proper part in economic and domestic life. As a group, patients presenting themselves at the clinics for nervous and mental diseases are not, *per se*, mental cases, but largely victims of functional or organic neurological conditions. In the past we found many cases with alochol playing the leading role as an etiological factor, such as tremors, cases of multiple neuritis, Saturday night palsies, etc. At the present time these cases are in the minority and syphilis has become the factor that must first be considered and eliminated or proved. Of the syphilitic conditions we find from the neurological standpoint three fairly distinct groups: The tabetic, the general paretic in the early stages and the cerebrospinal syphilitic. From the viewpoint of efficiency the tabetic consults us because

of diminished usefulness due to an ataxic gait, bladder disturbances, pains in the abdomen or lower extremities and possibly failing vision. The increased difficulty that he encounters in getting about, the beginning ataxic movements of his hands and arms, rendering exact movements impossible; the sleeplessness caused by urinary frequency and pains, and the worry over his failing health, all contribute to impair his efficiency as a workman and make him a poor economic asset. The full-blown case of paresis is obviously inefficient, and probably long before he is seen at the dispensary has been discharged from his employment because of his all too evident incompetence. The case of the cerebrospinal syphilitic presents a somewhat different picture, inasmuch as his earliest symptom—the manifest interference with efficiency as a workman—is a cranial nerve palsy, frequently a third, a sixth or an eighth and often bilateral involvement. He may also suffer from excruciating root pains and finds relief only through active antisyphilitic therapy. Many cases in this class are too often diagnosed "rheumatism," sciatica or neuritis and are treated accordingly, all to no purpose, until someone takes a Wassermann reaction, clarifying the diagnosis immediately and laying the basis for effective treatment. As a rule the majority of dispensaries are awake to the incriminating influence of syphilis and make the proper tests in most instances.

The true neurotic case is comparatively infrequent in dispensary work. We find many so-called psychoneurotic patients with ill-defined and vague symptoms who present on careful examination some very definite physical defect with the functional elements built upon this as a basis. These are in reality acquired neuroses or psychoneuroses, and a survey of dispensary reports shows the increasing tendency to closer analysis of all functional cases and the more frequent findings of organic disturbances as an underlying etiology.

As for the mental case—the frank psychosis—this is rarely met with. These patients do not find their way to the dispensaries, their symptoms are often too manifest, and they either come into violent conflict with the community or commit some overt

act which places them in the custody of an institution or brings them into contact with the police and later the institution. More frequently do we find parents bringing backward children to us—epileptics or psychopathic individuals who are unable to make progress in school, live peaceably with the family or even earn a part of their livelihood. Since these individuals cannot take a constructive part in the social or economic life of their community they cannot be considered in an analysis of efficiency of employees. They seldom reach the stage of paid employees, and whenever they do secure a position their defect is so grossly evident that they cannot be kept, and the question of adjustment or readjustment is for them out of consideration.

This brief analysis of types and conditions found in routine dispensary practice will apply in many ways to the industrial dispensary or clinic, and the problem is very similar as to solution and readjustment. Obviously the low-grade mental defective cannot be held, the insane case conflicts too violently with his surroundings and has to be discharged; but the functional case, the organic case and the environmental case offer a better prospect. The factors that must be considered are all-inclusive; they concern the physical condition of the employee—his mental condition, his social life, his environmental conditions and his training and family life. Hence we would emphasize the fact that the determination of the mental efficiency of the employee is not, properly speaking, a dispensary problem exclusively. We believe that an efficiency clinic or department should be the integral part of every corporation, and that here the studies of the assets and liabilities of every employee who needs attention should be solved as the occasion arises. The foundation for this belief is, as previously stated, that the problem must be attacked from so many angles that a pure neurological, physical, psychological, surgical or medical estimation is not sufficient. The individual who is selected for this important position must be broadminded, far-seeing, sympathetic and analytical as well as scientifically educated and endowed with a goodly proportion of plain common-sense.

Physical factors which so frequently enter into the production

of inefficiency must be sought out and treated; this deserves great emphasis. The mental side likewise needs investigation, for obviously the abnormal individual cannot be expected to give the same quality of service as the normal. But it is true, on the other hand, that certain of the higher grades of mental defectives can be classified and made to fill a part in the industrial organization; they can often be trained to usefulness in a limited capacity and can be assigned such work as they can best accomplish with satisfactory results. Here lies, to a certain extent, the value of psychometric ratings. A workman who has a definitely limited mental capacity is not capable of promotion or intricate work, and time should not be wasted in "pushing" him for advancement to the exclusion of better men. Recently we have heard much about the great value of the psychologist in the adjustment of employees in industries. But let us consider the field of this work from a broader viewpoint. In this connection the wholesale use of psychometric ratings in the military service in the World War has been particularly enlightening. The psychologist found the mental level of the soldier in a group examination, and if he measured below a certain accepted standard recommended him for rejection from service. But a broader analysis of these men in many cases revealed the fact that in civil life they were capable of holding moderately responsible positions, earning a comfortable wage, supporting a family with moderate ease and taking a part (in many instances) in social conditions that was indistinguishable from the position of many of their fellow-beings who were better endowed mentally. Now such men demonstrated that to a certain extent they could be relied upon, though perhaps not capable of leadership or greater responsibility. On the other hand some men who gave a satisfactory and acceptable rating were found to have lived a life of irresponsibility, never held a position for more than a few weeks, were incapable of supporting themselves and in many instances were wholly dependent upon their families or relatives. These men were unstable, unreliable, irresponsible, often the worst military offenders and far more incapable of making adjustments to the new life than some of those of lower mental averages.

The military experiences of both of us was quite in keeping with the above, and in the camp where one of us (C. P.), in conjunction with other neuropsychiatrists, was examining soldiers the division commander, becoming alarmed at the enormous numbers of men recommended for rejection by the psychological service, gave orders that all such cases should be examined again by the neuropsychiatrists and only their reports would be accepted as final. Still another example might be drawn from the experiences at Plattsburg, where all the so-called shell-shock cases were treated. Here all cases before beginning occupational therapy were given a psychometric rating to determine the amount and quality of work or instruction that they might be capable of. Theoretically this was the thing to do, but practically it was not so. The physician in charge of the ward in nearly every instance had to take into consideration every angle of the case (and definitely prescribe a certain kind of work), the time to be spent and the character, make-up and personality of the individual. The reason is obvious, for it was impossible to get at the underlying neurosis or other disorder by merely taking the mental level. In fact it may be said that the psychological arm of the service was limited in usefulness in all cases and was of practical importance only as an aid to the physician by saving him the tedium and time necessary to make a detailed mental rating. After a time, in this same hospital, one of us (T. W.), then in charge of all therapy, realizing the limitations of psychology, made a suggestion to Dr. Hollingsworth, chief of the psychological service, which he promptly acted upon, and suggested to the Surgeon-General's Office that this branch be abolished. It is further our opinion, and also that of most army men, that psychology not only has no place in the military service, but is an encumbrance and a heavy expense, and that in future wars no such department will be recognized.

Another point illustrative of the narrowed field of usefulness of psychology is brought out in a recent publication by Dr. Bailey, of New York. He has taken cognizance of the recent whirlwind enthusiasm for psychometric ratings of college students in an attempt to eliminate the unfit and determine the qualifications of

each one for pursuing his chosen branch. Now it can be readily seen that the boy who has sufficient mental capacity to take up college work is endowed with a certain amount of intelligence. But it is not wholly his mental intelligence that determines his success or failure; it is his individual qualifications in personality and character that fit him or unfit him. He may all unknowingly have chosen the branch which he is least fitted to pursue, and not meeting the requirements in adaptation to the work, flounder and fail. His intelligence may have been wholly sufficient for the chosen work, but by character, personality and make-up he was far better fitted for some other line. Now, Dr. Bailey, realizing this phase of the problem of maladaptation among students, proposes the organization of a clinic to which students and prospective students may be sent for an analysis of their abilities to undertake certain lines of endeavor and readjust those who have found difficulties. This is approaching the problem from the broadest angle—an understanding of the individual and helping the individual to understand himself. It, as has been shown, does not rest solely with the man's intelligence. Concretely, then, let us say that a mental rating is too limited to be of service by itself, for it does not recognize the other numerous factors which render the soldier or the student inefficient, and the same holds true for the employee. A careful neurological examination is necessary to dispose of the case with an organic nervous disorder, a physical examination to rule out a defect that is responsible for a neurotic condition, a mental study to detect the presence of a psychosis and a psychological examination to determine the mental level. Surely it can be readily seen that the problem offers possibilities in all these special branches, but that no one branch is sufficient in itself.

Now let us look at the problem from the viewpoint of the workman himself. Why is he inefficient? Why does he not get along with his work? Why is he dissatisfied? An inquiry into the conditions under which he lives, his environment, his home, his recreational life, his social standing and economic status are essential. We may find undernutrition, bad hygiene with poor

housing, overcrowded conditions, poor ventilation and insufficient heat; neighborhood surroundings where no man of healthy mental and physical attributes can be content; there may be alcoholism, drug addiction or other vicious habits which cause mental and physical degradation; it may be that sickness in the family or inability to meet expenses or other extraneous cares and worries distract attention and disorganize honest effort. The factor of physical disease, especially syphilis, is of great importance, for it so often exists unknown to the patient or others until its crippling effects have passed beyond the stage of repair. The patient who finds that he has syphilis either pays too little attention to it, neglects his treatment and renders the possibility of transmission in the early stages to others a liability, or understanding too well the ravages of the disease, becomes syphilophobic and is inefficient through worry and fear.

After all, what is the method of approach to the solution of this problem? What is the practical as well as the ideal way of dealing with it? First of all we believe it can be readily conceded that in the final analysis it hinges upon the personality and character make-up of the individual with the factors above discussed exerting an influence not to be overlooked by any means, but, on the whole, playing a minor role. Each separate field is too limited, too narrow in itself, and estimates only one side of the individual's capacity for progress and fails to recognize the larger and comprehensive view of the man's training, environment, personality, evaluation and adaptability which are so vital to a proper solution of his difficulty. There are certain adjustments and adaptations to the circumstances of life which we all must make, and with some it is more or less difficult than with others. The remedy lies often in the proper insight of the individual into his own complexities, but sometimes it must be shown the individual and sometimes perhaps it does not succeed. A neurological examination will not remove the worries of a distracting family life, however, nor will a psychological review of his attention, memory, ideation, etc., remove his physical disability; a surgical operation will not ventilate his house or pay his rent, but, nevertheless, these things must receive the attention they deserve.

Another phase of no mean importance in this problem is found in our compensation laws. We believe that an unhealthy mental attitude among employees is sometimes created by the provisions and regulations which are embodied in the laws of some of the states, New Jersey and Pennsylvania for instance, where the method of compensation is such that no final settlement is made of the case. The employee is examined by a board which estimates the nature and extent of the injury or illness and awards a certain amount of money for a certain length of time. The patient is told that if at the expiration of this time he is not well a second examination will be made and further compensation given. It is obvious that certain cases do not recover; these cases are analogous to the so-called "shell-shock" cases in the army, who, so long as the war was on, could with the greatest difficulty be induced to give up their neurotic indisposition, but who after the signing of the armistice recovered very completely and very promptly. The army case was motivated, perhaps all unconsciously, during the period of activities by a subconscious fear of actual warfare and its hardships, and then when the war was terminated by the armistice another motive supplanted the first, namely, the desire to be rid of the irksome routine of hospital life and the military authority over them. The same type is seen among those who because of imaginary ills sue corporations for vast and various sums, but who, strangely enough, do not seem to require much treatment or care after the case has once been settled in their favor. Now it is quite logical that the injured or ill employee who has the prospect of continued compensation perhaps unconsciously, but nevertheless truly, may persist in his disability indefinitely. It must be clearly understood, however, that the normal individual resists such a tendency successfully or at most does not think of it; but it is the neurotic or potential neurotic, the defective character and personality, who fall a ready victim to the temptation. The compensation should be so regulated that the award can be given in one lump sum and settled promptly and for all time. The state of California, investigating compensation problems, appointed a commission to study the adjustments

made in 100 individual cases and found very definitely that those to whom a lump sum compensation was made returned to work more quickly than those with partial settlement and further examination. While these facts are well known to all neurologists the state boards for compensation have not taken cognizance or advantage of it and partial settlements continue, to the detriment of the patient and losses to the corporations and states. It has been suggested that a competent neurologist serving on this board would be of advantage to all parties concerned.

Dr. Dana in the November issue of the *Archives of Neurology and Psychiatry* states that there are, as a matter of statistical interest, forty-two states and two territories that have compensation laws in this country. There are 2,500,000 accidents occurring yearly to workmen (four-fifths of them being trivial) and $120,000,000 are spent on them. In spite of all preventive efforts the number of accidents is said not to be decreasing. In New York state a large number of applications for further relief appear about two months after the accident, and despite the fact that they have been under medical care and supervision constantly, "They are still disabled—or think they are." Dana believes, with many others, that these cases are not really neuroses, but are traumatic conduct disorders, actuated by the hope of more money, stimulated by the sweet sympathy of overanxious friends and fed by the desire for an easy, workless existence. He further states that these patients would probably be decreased by one-half were there no compensation. Furthermore, each case would be vastly benefited if he could be made to understand emphatically that "his functional troubles will receive no recognition as permanent disability." An editorial comment in the same journal relative to neurotic conduct disorders states that the sovereign remedy is morale. The removal of the idea that benefit will be derived from prolonged disability is absolutely essential for the best interests of the patient. The beneficial influence on the morale of soldiers is clearly set forth by the method of dealing with neurotics in the French army. There no compensation is allowed for functional disorders, and the number of recoveries contrasts

very favorably with those countries who recognize such disabilities and reward them with generous pensions.

To recapitulate, then, emphasis should be laid, first, upon the fact that the proper estimation of the mental efficiency or inefficiency of the employee depends not upon any single determination but rather upon a broad comprehensive study of his life from every viewpoint, and particularly his personality, health and character make-up. Second, there should be an efficiency clinic in every large corporation, with a broadminded man at the head of it who has the capacity of appreciating all the factors concerned, and, more particularly, knows his fellow-men. Third, there should be a revision of the compensation laws, abolishing partial settlement, making payments in one lump sum and creating a morale among employees which would markedly diminish invalidism and promote economical efficiency.

The Hospital in Modern Industry: Dispensary Determination of the Physical Ability of Employees

BY FRANCIS OLCOTT ALLEN, JR., M.D.

The importance of industrial medicine is now so well recognized that no apology need be offered at this time. Yet the development of this new branch of medicine has been so rapid that the phrase "the hospital in industry" would have conveyed no meaning a few short years ago. Our general hospitals and dispensaries were founded by the charitable to care for the sick and miserable, the discards of industry, with no thought of increasing factory production and no conceivable relation to dividends and profits. But I think it is fair to say that the great impetus behind the forward movement of industrial medicine is the realization by the captains of industry that healthy, happy employees form one of the strongest possible bulwarks for business. As with prohibition, the eight-hour day, the abolition of child labor and many other social ideals

the final achievement comes only when the economic pressure falls into the same side of the scales as the humanitarian impulse.

A tremendous added push was given to industrial medicine by the World War. In those days of stress it became clear to everyone that man-power, both in the army and in the industries behind the army, was paramount and that medical care, in its broadest sense, was essential to sustained man-power. Dr. Mock, in his book on *Industrial Medicine*, tersely says: "Conservation of man-power with maximum production is the battle-cry of the country. The adoption of industrial health services by every industry is the answer." And a third factor, which is both a cause and an effect of the movement, is the enactment of compensation laws which oblige employers to provide medical care for employees injured or sickened by their employment.

The scope of industrial health service is very wide. Its application necessarily varies in different industries and in different plants. Its chief aims may be said to be four:

1. Prevention of disease and injury. Prevention covers a multitude of details such as systematic physical examinations of employees, working hours, ventilation, water supply, dust control, poison control, safety appliances, etc. This is an immense field, the most important and far-reaching part of the whole program.

2. Treatment of disease or injury. This is the direct and primary application of the principle of industrial medicine out of which preventive care and the other departments have grown. Treatment begins with first aid on the spot, is continued in the shop dispensary or hospital and may be carried to the employee's home. Treatment sometimes is given for diseased conditions not caused by the employment, and may extend to other members of the employee's family. It is given not only to the wage-earner, but may also be given to the clerical and salaried force. In the completely organized plants the company doctor becomes a valued adviser to the whole personnel of the industry.

3. Reconstruction of crippled and disabled employees by all the modern methods of developing the handicapped.

4. Adjustment of the handicapped employee to a job.

I have thus briefly sketched the outlines of industrial medicine in order to see more clearly where the dispensary of the ordinary general hospital is to function in relation to it. The tendency in the larger and more progressive plants is certainly toward more and more complete supervision over the health of their employees by the plant itself. And there is good reason for this, for the dispensary cannot conveniently make the preliminary or periodic examinations of employees, which are of fundamental importance in any well-organized plant; the dispensary cannot take any effective part in preventive measures which are of greatest value and promise to the movement; the dispensary cannot render first aid, often the most important part of the treatment of minor surgical injuries; there is an immense waste of time in going to and from the dispensary at stated hours and waiting in turn for treatment; the dispensary doctors cannot have the same industrial point of view as the company doctors; and experience seems to show that the best results for the patient and the industry are obtained by the well-equipped plant dispensary. From thoroughly organized plants, then, the general dispensary will receive no patients.

But there are many industrial plants of such size or character that this complete supervision of employees is impracticable. It is from these industries that the general dispensary will receive its patients. The number of patients will vary with the locality of the dispensary, the degree of development of industrial medicine in its community and the number of private physicians who do industrial work. The dispensary can only fill the gaps.

Although the progress of industrial medicine seems to leave but a restricted field for the dispensary, it is essential that the dispensary be equipped to properly care for the industrial cases which come to it. If it is not it is failing in a very important part of its service to its community. The general hospital dispensaries with which I am acquainted are not doing their part as efficiently as they should. Industrial medicine has taken our hospitals unawares and they are not yet adjusted to the new point of view. The dispensary is still looked upon as a purely charitable institu-

tion, but this branch of its work is not charitable—it is social and economic, and industry is expected to carry its expense. While the industrial work of a dispensary may never be a source of income it should never be a drain upon the charity funds. Until this distinction is realized and special clinics on a self-supporting basis are established I do not think our dispensaries can, in any complete sense, determine the physical ability of the employee. The dispensary is far from ideal as a center for industrial medicine, nor does the present trend of practice indicate that it will be the ultimate choice for this purpose; yet I believe it must meet the problems being thrust upon it more effectively than it is meeting them today. This in my opinion can only be done by establishing clinics in which the doctors and other workers receive adequate compensation from the fees paid by the industries served and from which the hospital receives proper remuneration for the use of its buildings and equipment. To make such work really effective the relation between the dispensary and the industry must be on a strictly business basis.

If such arrangements can be carried out the dispensary will be of real though limited service to those industrial plants which do not find it advisable to establish self-sufficient medical departments of their own. To recapitulate:

In prevention the dispensary can make preliminary and periodic physical examinations of employees, though with much inconvenience and waste of time for the industry; but it cannot handle the problems of dust, poison, machinery risks and so on.

In treatment it can take care of ambulatory cases of all kinds, but it cannot give first aid.

In reconstruction it can render great service through its orthopedic and occupational therapy departments.

In readjustment of the worker to his work it can do a great deal through its social service department, but it cannot be fully efficient because it cannot fully know the job.

In other words the dispensary cannot go out into industry to control the hazards and exactions of employment; but it can and should prepare itself to determine and enhance the physical ability of the employee who comes to it for aid.

REPORT OF THE COMMITTEE ON MÜTTER MUSEUM FOR 1920

The Committee on Mütter Museum begs leave to offer the following annual report:

During the past year the visits to the Museum by the profession have largely increased, many physicians from various parts of the country having availed themselves of it to study specimens connected with subjects in which they were interested.

Many Fellows of the College have also visited the Museum, several of whom have used it for class demonstrations.

It has proved, as in the past, impossible to state positively to what extent the Museum has been used, as in spite of all our efforts many visitors fail to register in the book kept for that purpose; especially is this the case in the evenings, when the Museum is open, at which time visitors are coming and going continuously. The register shows that one hundred and sixty odd visitors have registered, and we estimate that at least one hundred have not entered their names.

The Mütter Lecture for 1919 was delivered on December 12, in Thomson Hall, by Alexis V. Moschcovitz, M.D., professor of clinical surgery at Columbia University, New York City, before a large audience, on the subject of "Newer Conceptions of the Pathogenesis and Treatment of Empyema."

The Lecture for 1920 will be delivered on December 10, in Mitchell Hall, by J. Chalmers Da Costa, M.D., LL.D., Samuel D. Gross Professor of Surgery, Jefferson Medical College of Pennsylvania. Subject: "Osteitis Deformans (Paget's Disease of the Bones)." A large attendance is expected.

As your committee has experienced much difficulty in the past in carrying out the request of Dr. Mütter, that copies of the lecture be placed on file in the College Library, they have sought

and obtained the consent of the Council to publish the lectures in future in the *Transactions* of the College at their expense. In this way it is hoped that a complete file of future lectures will be available for the Fellows of the College and the carelessness or negligence of lecturers obviated.

The following additions have been made to the Museum during the year:

Two French gas-masks: deposited by Dr. Clifford B. Farr.

Specimen of mesenteric embolism: deposited by Dr. Frank Benton Block.

Mechanical devices and photographs of their application for the treatment of various nerve paralyses and stiffness of joints, used during and since demobilization for injuries sustained in the World War: deposited by Dr. John H. Arnett.

Japanese antique lacquered cabinet containing instruments, the property of the late Dr. Samuel D. Risley; presented by his widow.

The committee regret that owing to the lack of shelf-room for their display they were obliged to decline a number of instruments of historic value.

While the Museum has received but few additions during the past year, through the kindness of Dr. S. Lewis Ziegler the committee is negotiating for the purchase of a series of French models showing injuries to the face sustained during the World War, with the operative procedure adopted in each case and the results obtained. We believe that these will be valuable not only from a historical standpoint but as suggestive of the best surgical treatment in like cases.

The permanent preservation and arrangement of the collection deposited by the Pennsylvania Hospital Unit No. 10 (previously reported) has required more time than we originally expected. We hope, however, to have the entire collection ready for exhibition in the near future.

OSTEITIS DEFORMANS (PAGET'S DISEASE OF THE BONES)[1]

The Mütter Lecture for 1920

By J. CHALMERS DaCOSTA, M.D., LL.D.

At the very threshold of this address it would seem appropriate, even obligatory, to say a few words at least of Thomas D. Mütter, the author of the Lecture Foundation and a notable benefactor of the College.

Thomas Dent Mütter was born at Richmond, Virginia, in March, 1811. His father's ancestors were German; his mother's were Scotch. His father was a prosperous merchant in Richmond, Va., and died when the son was seven years of age. After the father's death the family removed to a country-place in the interior of Virginia. Thomas was educated in the country schools and at Hampden and Sidney College, a college which had among its incorporators Patrick Henry, James Madison and other celebrated men.

In accordance with the old system, Mütter began the study of medicine as an office student. Doctor Sims, of Alexandria, was his preceptor. After a year with Doctor Sims he entered the medical department of the University of Pennsylvania and took his degree in 1831 when only twenty years of age. His teachers were Physick, Dewees, Samuel Jackson, Nathaniel Chapman, James, Coxe, Gibson, Horner and Hare.

After his graduation he went to Paris, where he remained for two years studying under the great French masters of that day.

[1] In the preparation of this article I was greatly aided by Dr. Elmer H. Funk and Dr. John F. X. Jones.

And truly they were great masters. Never in the records of medicine have so many illustrious surgeons taught and practised in one city as were teaching and practising in Paris then. Think of some of them! Nélaton, Maisonneuve, Chassaignac, Marjolin, Roux, Blandin, Breschet, Dupuytren, Lisfranc, Cloquet, Jobert, Boyer, Ricord, Huguier, Guerin, Malgaigne, Sappy, Gosselen, Velpeau, the elder Larrey, the younger Larrey, Amussat, Lembert and Civiale.

Besides these eminent surgeons were the following medical practitioners and teachers: Cruveilhier, professor of pathological anatomy; Andral, professor of general pathology and therapeutics; Trousseau, professor of therapeutics and materia media; Dumas, professor of organic chemistry; Broussais, professor of the practice of medicine; Louis, professor of clinical medicine; Gay-Lussac, professor of chemistry; Lugol, physician to the St. Louis Hospital; Baudelocque, physician to the hospital for Children's Diseases; Alibert, ophthalmologist to the Hospital for the Blind; Calmeil, of the Charenton Lunatic Asylum, and Esquirol of the Salpêtrière; Voison, Huerteloupe and Moreau, physicians to the Bictre, and Orfila, dean of the Faculty of Medicine of Paris and professor of toxicology.

It is no wonder that Mütter became an ardent and enthusiastic follower of the French school.

On his return to America he married Miss Mary Alsop, of Middletown, Conn., and began practice in Philadelphia as an ardent exponent of French surgery, especially of orthopedic and of plastic surgery. He was a master in both of these branches. He was highly successful and was aided powerfully by Professors Gibson and Jackson. He became connected with the Philadelphia Medical Institute, from which came many noted teachers, and soon acquired a great local reputation as a teacher.

In 1841 Granville Sharp Pattison left Jefferson College for New York. Joseph Pancoast was transferred from the chair of surgery to the chair of anatomy; Jacob Randolph, Physick's son-in-law, was elected professor of surgery and Mütter was made adjunct professor of surgery. Randolph, who was then in Europe,

declined, and Mütter, at the early age of thirty years and only ten years after his graduation, was given the full chair of surgery and became a member of the famous faculty of '41. This faculty remained intact for fifteen years. It consisted of Robley Dunglison, Joseph Pancoast, Charles D. Meigs, John K. Mitchell, Robert M. Huston, Franklin Bache and Thomas D. Mütter.

For fifteen years Mütter taught with wonderful success and he made the Jefferson College Clinic one of the most celebrated surgical clinics in the United States. All his professional life he was tortured by the gout, and finally the disease so impaired his health that he resigned his chair, abandoned practice and went to South Carolina to live. He died in Charleston in 1859. He is buried in Middletown, Conn. He left no children.

In appearance he was slender and graceful, of medium height, with a fine forehead and blue eyes. Sully's portrait, which hangs in the Jefferson College, shows that he was a singularly handsome man. He had a clear, sweet voice of remarkable strength and carrying power. In dress he was scrupulously neat—in fact almost a dandy. He rode about town in a very low carriage drawn by a great gray horse, and was always attended by a servant in livery. His personality was charming, his manners were fascinating; he was a delightful conversationalist and an admirable raconteur. He was much sought after socially; his friends loved him and he was immensely popular with medical students. How Mütter stood in class opinion is shown by the following statement: In those days, as in much later days, before the world became adamantinely moral and when there were still cakes and ale, students were often Bacchanalian artists and were not infrequently arrested for vinous exaltation and disorderly conduct. They always sent for Mütter to bail them out, and he always answered the call.

He was devoted to anatomy and pathology, and all his life collected specimens which now form the basis of the Mütter Museum.

As an operator he was skilful, rapid, ingenious and brilliant. He was particularly strong in operations for cleft palate, harelip,

strabismus, cataract, club-foot, tumors and deformities caused by scars, and in the performance of rhinoplasty. Professor Brinton told us that later in life, when his health had become impaired, during great operations he was prone to lean somewhat, though always gracefully, on the strong arm of the professor of anatomy. As a lecturer he was fluent, clear, distinct and enthusiastic. He spoke in excellent English; his voice was most attractive; he knew his subject thoroughly and he captivated his hearers. Gross came over from New York to hear him and was greatly pleased.

He wrote very little. His essay on club-foot attracted considerable attention. In 1846 he edited, with notes and additions, Robert Liston's *Lectures on the Operations of Surgery*, and added nearly 250 pages to the volume. This book long enjoyed wide popularity.

His great service to the profession was in bringing a knowledge of French surgery, especially of orthopedic and of plastic surgery, to the United States. Before his day most of our surgical views came direct from London and Edinburgh. He greatly broadened the mental horizon of the American medical profession. His reputation will not depend upon his writings, but will rest chiefly upon the Mütter Museum and the Mütter Lectureship, and hence it will last as long as the College itself.

Happy they whose written pages
Perish with their lives.
If amid the crumbling ages
Still their name survives."

We speak tonight on osteitis deformans, Paget's disease, first described by Sir James Paget in 1876. He reported five cases.[1] In 1882 Paget reported several additional cases.[2]

On November 5, 1876, Paget says, in a letter to one of his sons: "I have finished my paper on the big bones and the disease for which you justified the name osteitis deformans. It was a real pleasure working on it—a renewal of the old pleasure of

[1] Med. Chir. Trans., London, 1877, lx, 37.
[2] Ibid., 1882, vol. lxv.

studying and describing museums in which I spent so long a time years ago."[1]

On November 14, 1876, Sir James Paget communicated to the Royal Medico-Chirurgical Society a paper which he called "A Form of Chronic Inflammation of the Bones (Osteitis Deformans)."

A great many cavil at the name of a man being given to a disease, to a symptom, to an operation, to an instrument or to an anatomical region, and yet in many cases it is highly useful. It serves to designate conditions of which the pathology is doubtful. Again it is pleasing to find the names of great men shining out as jewels and set forever in the science they helped to develop. Few of us, I think, would care to give up Colles's fracture, Halsted's operation for breast cancer, Graves's disease, Bryant's triangle, Scarpa's triangle, Hunter's canal, Dupuytren's contraction, Pott's disease of the spine, Pott's fracture, Pott's gangrene, Larrey's amputation at the shoulder-joint, Teale's amputation, Heberden's nodes, Sydenham's chorea, Glénard's disease, Erb's palsy, Addison's disease, Bell's palsy, Brodie's abscess, Charcot's joint, Hodgkin's disease, Jacksonian epilepsy, Littre's hernia, Ludwig's angina, Morton's toe, Raynaud's disease, Battle's sign and scores of other eponyms. So let us retain the term Paget's disease of the bones.

I do not propose setting forth in elaborate detail all of the well-known facts of this disease. To do so would be a labor of supererogation. It has been done by others far better than I could do it. It has been especially well done by Charles P. Emerson in the *Modern Medicine* of Osler and McCrae. This is the best text-book article on the subject I ever read. I shall simply consider some of the particularly interesting facts and shall try to draw conclusions from them. I will try to throw a sidelight here and there, a sidelight of conjecture upon certain very foggy problems. Unfortunately light does not penetrate far into fog. Particularly I purpose setting forth some important observations which have been made during very recent years.

Before the publication of Sir James Paget's first paper upon the disease which bears his name, and which he called osteitis

[1] Memoirs and Letters of Sir James Paget, edited by one of his sons.

deformans, the term osteitis deformans had been used as a designation for a group of very different maladies, maladies having in common only the one feature of bone deformity.

Czerny[1] employed the term in 1873 as a name for a condition of local softening of the lower portion of the tibia and fibula accompanied by curvature of the limb. The patient was twenty-two years of age. Czerny considered it possibly a local osteomalacia. It is certain it was not Paget's disease. Czerny pointed out that Scoutetten, in 1841,[2] describes the case of a tailor, aged twenty-five years, in whom there developed bending of the lower part of his leg and great pain. He described it as the only case of its kind on record. This report was translated into German by Kleberg and appeared as "Ein Fall von partieler Osteomalacie," Dorpat, 1864. (A case of partial osteomalacia.)

Solly[3] reported two cases as local osteomalacia in 1844. In one patient, aged thirty years, there was softening of the tibia and fibula and also thickening and ulceration of the skin. The other case was fifty years old. In it there was softening of one of the femurs. The bone was very thick and very bowed. He wore an apparatus to take weight from that side.

Mosetig[4] reported under the name of osteohalisteresis a case of local softening of the bones of the leg. The patient was twenty-one years of age. He had pain and bending of the leg. R. Volkmann believed that such cases were due to a partial decalcification sparing the cartilage.

Weinlechner[5] saw two cases; one was a butcher between twenty and thirty years of age. There was bending of the right leg. No history of trauma was given. The leg became elastic. In other reported cases both legs were bent but improved under proper nourishment.

Czerny said that since the name "osteohalisteresis" as well as

[1] Wien. med. Wchnschr., September 27, 1873.

[2] Gaz. méd. de Paris, 1841, p. 428.

[3] Schmidt's Jahrb., xliii, 86, and Med. Chir. Trans., XXVII, September 2, 1844, vol. ix.

[4] Wien. med. Presse, 1868, No. 4, p. 89; Const. Jahrb., 1868, ii, 370.

[5] Wchnschr. d. Ges. d. Aerzte, in Wien, 1869, xxv, 21; Const. Jahresber., 1869, ii, 358.

"local softening" drew attention to a part only of the pathological process, and, moreover, since the connection of the same with osteomalacia was very doubtful for several reasons, and since, on the other hand, all the characteristics of an osteitis terminating in sclerosis were present, he preferred to comprise these cases under the name of "osteitis deformans."

Various conditions of bone disease with deformity were called osteitis deformans. Excess of callus, bending of callus, congenital deformity, osseous syphilis and numerous rickety deformities were so called. Before the use of this term nearly all bone deformities were classified under the title "rickets." Paget used the term "osteitis deformans" to describe what he regarded as a special disease.

Since Paget's day various other names have been applied to this disease, for instance: Osteolysis; pseudorachitis senilis; osteomalacia chronica deformans hypertrophica; osteomalacia hypertrophique benigne; osteite ossifiante diffuse; craniosclerose; general hypertosis; osteoporosis; senile rickets; fibrous osteomyelitis, etc. It has as many names as a hereditary princeling of a petty domain. It is certainly a rare condition, though I doubt if it is nearly as rare as statistics would indicate. I have the records of two recent unreported cases of my own and the record of an unpublished case kindly sent me by Dr. Jane Sands, of Bryn Mawr College Infirmary. Other surgeons tell me of unreported cases.[1] Two hundred and fifty-one cases have been reported. Many subjects die of an intercurrent malady without the disease having been recognized. Many never present themselves to hospitals. In nearly all of them the original diagnosis is rheumatism. The pains continue for years and may be regarded as indicative of incurable rheumatism, without the patient ever having been seen by a trained observer. Some cases are discovered accidentally. Only a week ago I discovered in the out-patient room a case in which the signs were limited to the head. The patient had come to see us because the enlargement had

[1] Since the reading of this paper, Dr. Harvey Righter called me to see a case in consultation. I saw a case in the ward of Prof. Hare and Dr. George Bevier sent me the records of a case in the Philadelphia General Hospital.

begun to worry her. Coppez[1] found four unpublished cases of Paget's disease among eye patients. In one case there was opacity of the lens; in another an atrophic plaque covered the macula of the right eye; in another the retina was the seat of multiple hemorrhage; in another there was beginning cataract. In this connection it is interesting to recall that the second case reported by Paget had retinal hemorrhage, first in one eye and then in the other.

If a person observes when walking about the city, and if he has the habit of taking frequent and long walks, he will not walk very often or very long in a crowded neighborhood without seeing a case of Paget's disease, usually some old person hobbling along with the characteristic attitude and gait. Such a person probably is thought to be a helpless and hopeless rheumatic. One does not see cases in fashionable walks or business centers, but rather among the rabbit warrens of the poor. One to see them must belong to what Christopher Morley calls the "goodly fellowship of saunterers." One must be what Morley calls "an acolyte of the excellent church of agoralaters." He must haunt the byways and the sunless alleys. He must love his Philadelphia and study her, just as Doctor Johnson loved the smoke and dust and mud and roar of London. Try it and see the thronging interests of life. I am convinced that a careful search made by practitioners would disclose a large number of hitherto unrecognized cases.

The pathological anatomy of the disease has been a matter of great dispute, and it cannot be claimed that this is yet settled. Paget himself regarded it as a chronic inflammation of the bones, a view which is still largely held. He says that the periosteum is not changed visibly, is not thickened and is not any more adherent than it should be. He states that the outer surface of the bone is "irregular and finely nodular, as with external deposits or outgrowths of bone, deeply grooved with channels for the larger periosteal bloodvessels, finely but visibly

[1] La Clinique pratique medico-chirurgicale, January, 1913, p. 265.

perforated in every part for transmission of the enlarged small vessels." The medullary structures appear to the naked eye as little changed as the periosteum. Paget goes on to say that the compact substance of the bone is thickened, the thickening being due chiefly to outward expansion and some superficial outgrowth. In some places the outer layers of the bone seem to be peculiarly porous, but the greater part of the bone becomes a hard, porous and finely reticulated substance like very fine coral. In some places, especially on the walls of the femur, there are small ill-defined patches of pale, dense and hard bone looking as solid as brick.

The Haversian systems and canals are diminished, but the canals themselves are enormously enlarged.

Paget rejects neoplasm and hypertrophy as causes of this condition and decides on chronic inflammation. He says that the changes in the bone and the manner in which they take place indicate inflammation. For instance the walls of the enlarged Haversian canals are not smooth but are eaten out in a series of curves or concavities with the production of what are called Howship's lacunæ, a characteristic of inflammation. The tissues connected with the canals almost precisely resemble the tissues found in the place of inflamed bone.

J. G. Adami and John McCrae[1] state that in conditions of osteitis deformans with marked absorption of the bone trabeculæ the fatty marrow may become replaced by fibrillar connective tissue. Associated with this there is a diminution of the number of osteoblasts. They distinguish this simple atrophy from halisteresis, a process "in which the absorption of the bone is preceded by solution and absorption of the bone salts. This latter process is dominant in certain remarkable disorders, notably in osteomalacia and in many cases of so-called osteitis deformans, between which disorders there are many points of relationship." The same authors state that in osteitis deformans there is, first of all, halisteresis resembling that seen in osteomalacia, but

[1] A Text-book of Pathology.

followed or accompanied by much more pronounced periosteal and even medullary new-growth of osteoid tissue. The new osteoid tissue does not indicate thorough calcification, but absorption is apt to occur, which causes enlargement of the medullary and the Haversian canals. They say that associated with this the medulla becomes fibroid, a change which von Recklinghausen and others regarded as inflammatory, calling the condition osteomyelitis fibrosa. Adami and McCrae regard the process as metaplastic and not inflammatory, and state that such fibroid medulla is apt to exhibit areas of degeneration with cyst formation; but in certain cases becomes very cellular and develops a tendency to the formation of new lamellæ of the bone. Growth of a sarcomatous nature may occur. The possible relationship between osteomalacia and osteitis deformans has been dwelt on by others, it having seemed to some observers that Paget's disease was a further development of what in the beginning was osteomalacia. Von Recklinghausen believed in this connection. Connolly[1] thinks it possible that osteomalacia is the acute form of the same disease which when chronic is called osteitis deformans.

There is also suggested a likeness to acromegaly, but the bones of the face are less often involved in Paget's disease. The tibiæ bend in Paget's disease and they do not in acromegaly. There is no enlargement of the soft parts and the trouble is often asymmetrical in Paget's disease. The soft parts are involved and the lesions are symmetrical in acromegaly (Nothnagel). In acromegaly the new bone is solid and there is no preliminary absorption.

Edwin A. Locke[2] states that the disease usually begins in the long bones of the legs but may begin in the skull. Eventually it involves practically the entire skeleton. The bones affected enlarge greatly and the long bones tend to a cylindrical form and show the distribution of the process throughout the whole shaft. In some cases the condition remains long limited to one bone. In a few instances the disease can be observed limited to an indi-

[1] Australasia. 1916, 1.
[2] Medical Clinics of North America, January, 1918.

vidual area of one bone. For example it may be seen when confined to a third or more of the bone, although eventually the entire bone becomes invaded. Locke points out that the long bones of the lower extremities become heavily curved. Much but not all of the curving is due to the body weight. It is to be noted that the humerus and forearm bones bend, but not nearly so much as the tibia and the long bones. For the most part the bones are soft and cut easily with a knife. This is true beyond doubt of the early stages of the disease, although in certain areas, especially in the later stages of the disease, the bone becomes of ivory hardness. The cut surface exhibits a coarse trabecular structure alternating with areas of diseased bone tissue, and the bones are extremely rich in blood. The marrow space is encroached upon early and is frequently entirely obliterated. It is seldom that the periosteum is thickened, but frequently it is adherent. Small cysts are commonly noted. The articular cartilage is usually preserved. Caries or necrosis never occurs.

It will be observed from these few quotations that the nature of the bone changes is still a subject of great uncertainty. Some dispute the inflammatory origin asserted by Paget. Stilling has in recent years maintained the inflammatory origin. Von Recklinghausen believes that osteomalacia is the first change, and it so reduces bone cortex that the bones bend. After this, according to Klopton, comes inflammation in the areas of osteomalacia, and inflammation causes the formation of fibrous tissue. Certain it is that the first step in the process is bone absorption, which causes enlargement of the Haversian canals, and the next step is the formation of new osteoid tissue. Steele asserts that the new bone does not calcify and is in turn absorbed, and that the medulla is converted into connective tissue of a very vascular sort. Lund has the view that some constitutional necessity or perversity leads to overuse of the greater part of the skeleton, that the bones subjected to the greatest use become deformed and that the deformity is compensated for by hypertrophy.

Charles P. Emerson[1] says: "As to the nature of the disease

[1] Sir William Osler and Thomas McCrae's Modern Medicine, 1909, vol. vi, p. 715.

there has been much uncertainty. Some have found that it is not an indeterminate disease but an extreme stage of arthritis deformans; some are willing to agree with Paget that it is an inflammation the nature of which is little known. Beclere called attention to the marked arteriosclerosis in these patients and suggested that the bony changes are due to a special involvement of the nutrient arteries of these bones. This would explain satisfactorily the variable and unequal distribution of the bony lesions. Others say it is due to arteriosclerosis of the nutrient vessels of the nerves."

Locke[1] states with great clearness the essence of the process. He says the process is a double one. First, old bone is absorbed; second, new fibro-osseous tissue is laid down. He says that from extensive *x*-ray studies it becomes evident that the two processes go hand in hand, although probably the resorption of old bone is the initial step. The new bone is deposited later from the periosteum and to a much less degree from the medulla. Some have suggested that the thickening of the bone is due to the bone formation going on as an attempt to apply a buttress and stay the process. But this cannot be true because the chief thickness of a curved long bone is on the concavity rather than on the convexity of the curve.

We may state the bone changes in all bones involved consist in first thickening; then the long bones of the lower extremities bend, largely because of the weight of the body; and they not only bend but also twist.[2] The femur frequently looks as though it has been grasped by the hands of a giant, bent into a bow and then twisted. The femur bends outward and the tibia forward. The bones of the upper extremities also bend, although to a less degree.

The view that the changes are osteoarthritic in character is not to be entertained because the joints are very seldom affected in Paget's disease. It is true that joints in a condition of arthritis deformans have been occasionally described in Paget's disease,[3]

[1] Medical Clinics of North America, January, 1918.
[2] Wood, Francis Carter: A Text-book of Pathology, by Delafield and Prudden.
[3] Jones, Eleanor: Medical Review of Reviews, New York, 1914, vol. xx.

but this is a mere coincidence. Perhaps in such cases both Paget's disease and the arthritis deformans were caused by some unfound or unsuspected infection. Syringomyelia has been found at necropsy in a case of Paget's disease[1] and scleroderma has been found associated with osteitis deformans,[2] but no one would suggest syringomyelia or scleroderma as being causal of Paget's disease. It is an interesting fact that although the bones in Paget's disease are so much affected, spontaneous fracture is extremely rare.[3]

Morton Prince[4] states that the pathology consists in, first, absorption of bone; second, new formation of bone without calcification, and third, new formation of bone with calcification; and that any one of these pathological processes may predominate.

Above we referred to Locke's insistence on the value of *x*-ray pictures. The first *x*-ray picture of this disease seems to have been taken in 1901 by Gallois at the Beclere Institute in Paris. Every case of Paget's disease should be subjected to careful *x*-ray examination of the skull and of all the other bones. A study should always be made of the size of the pituitary fossa in order to accumulate statistics on this point. C. W. Perkins[5] reports a case in which the *x*-ray showed a small undersized pituitary fossa bridged over by a sclerosed roof.

A characteristic feature of most cases of the disease is the thickening of the skull. Some cases never show it—most cases show it sooner or later—some cases exhibit it as the first sign. In fact, this may be the one phenomenon that is manifested. Whereas it is true that the long bones of the extremities suffer more often than other bones and that the tibiæ suffer most of all, there are some cases in which we find no changes except in the skull. Perhaps this is simply the beginning of a condition which in the long run is bound to extend to the rest of the body. A person may go on for years taking progressively a larger and larger

[1] Marie and Leri: Bulletin de la Société médicale des Hòpitaux, Paris, October 31, 1919, 43, No. 30.
[2] Pernet: British Jour. of Dermatol., 1917, 29.
[3] Wood, Francis Carter: A Text-book of Pathology, by Delafield and Prudden.
[4] Am. Jour. Med. Sc., November, 1902.
[5] Am. Jour. Roentgen., March, 1919.

hat without any other signs of change. When the head is involved alone it is often a question whether or not we are dealing with the condition Virchow called "leontiasis ossea." This has been considered by many as an independent disease limited to the face and cranium, differing from Paget's disease in that the bone is said to be hard from the very beginning and the lesions are asymmetrical. But Max Koch has claimed that a microscopic picture of the bone of Virchow's disease is identical with that of Paget's disease. Many pathologists are inclined to believe that Virchow's disease is but an early stage of Paget's disease, limited to the cranium (hyperostosis cranii), to the face or to the cranium and face (leontiasis ossea).

A case reported by Eddey suggests strongly that Virchow's disease is the first stage of Paget's disease. In this case, which was supposed to be leontiasis ossea, typical lesions of osteitis deformans appeared later in many bones. In Elsner's case one side of the skull alone was involved many years before other bones. Funk, Hawk, Bergeim[1] and I reported a case of one-sided cranial involvement, and I showed one to my clinic recently.

The bones of the hand and the bones of the foot seldom manifest the changes of Paget's disease, but they do occasionally, and the condition may even start in the hand or foot. Meier's case started in the external malleolus and the tarsus. Observers have described changes in the metacarpus and phalangeal changes with the formation of the nodes of Heberden.

In a large majority of the cases bones on both sides of the body are involved in changes that are symmetrical or unsymmetrical. Occasionally the involvement is unilateral or even monosseous. In a very interesting reported case one side of the body was involved and remained so for eleven years. Writers call this condition unipaget. Nobody knows whether or not the patient subsequently developed lesions on the other side. In one case the clavicle was the bone first involved. There are cases in which but one bone is found involved—usually the tibia. The femur alone, however, the humerus alone, the skull alone or in fact any

[1] Report of Jefferson Medical College and Hospital, 1915, vi, 1–44.

bone alone may be involved. If such a case is followed for years it will probably be found later that other bones suffer. When the tibia is involved alone and the saber-scabbard type of bending occurs the condition may be confused with syphilis. Massary and Lachelle[1] write upon Paget's disease localized in one bone. In a woman the right femur alone had been involved for ten years.

Etiology. *Race.* Nothing is known in regard to race predisposition. By the courtesy of Dr. W. Stone, the curator of the Academy of Natural Sciences, Dr. John F. X. Jones examined the great collection of skulls in the Academy and was unable to find a skull which suggested Paget's disease.

Age. Most cases begin near the age of fifty years, but Elsner reported a case which began at the age of twelve years, Thibierge at thirteen, Hartman at fourteen and Jones at sixteen years. Several other cases beginning at a very early age have been placed on record. I have seen one at the age of nineteen years. Kelstadt saw a patient, aged thirty-five years, whose head had been large since birth, and Vogel saw a patient, aged sixty-eight years, who had always had a large and deformed head. In the article by Da Costa, Funk, Hawk and Bergeim we reported a case which was first noticed at eight years of age. Packard, Steele and Kirkbride[2] speak of a case which began at the age of seventy-nine years.

Duration. The disease lasts for years. In the patient of Moizard and Bourges the disease lasted fifty-two years.

Sex. Males are more liable than females. Packard, Steele and Kirkbride say that out of 100 cases 67 are males.

Heredity. The number of reported cases in which the involvement was a family involvement points to the predisposing influence of heredity. There have been reported the cases of two brothers, of a mother and daughter, of a father and daughter, of a sister and brother, of a father and two sons, etc. In our article, previously referred to, we state that in 7 per cent of cases this family tendency was manifested. Locke[3] believes heredity is influential and found it in 20 per cent. of fifty patients. Emerson

[1] Bull. de la Soc. méd. d. hôp. de Paris, January 30, 1920, No. 4, xliv.
[2] Am. Jour. Med. Sc., Nov, 1901.
[3] Medical Clinics of North America, January, 1918.

believes that Paget's disease can be inherited. Funk[1] refers to an interesting case in which a twin sister did not have the disease.

Influence of Syphilis. Many observers have asserted that there is causal influence in syphilis, but this has been emphatically denied by other authors. In one-fifth of the cases there is a positive Wassermann and in four-fifths a negative Wassermann. In some cases a blood negative has been confirmed by negative spinal fluid. In the three cases reported by Da Costa, Hawk and Funk the blood Wassermann reaction was negative. In a recent case reported by Stivelman and Ray the Wassermann reaction was negative in both blood and cerebrospinal fluid.[2] Elsner and Kutscha stated that a positive reaction has never been found in uncomplicated cases. The clinical history of most reported cases is against syphilis as a cause. The administration of iodide does not seem to be of any service except perhaps in abating pain.

Fournier and Lannelongue are emphatic in their claim that syphilis is a cause. Lannelongue states that Paget's disease and the bone trouble of hereditary syphilis possess five elements in common. Both prefer certain bones (the long bones and especially the tibia); in both there is multiple bone involvement; in both there is bone enlargement; in both there is a prodromal stage of pain, and in both there is a deformity and the formation of the saber-scabbard shin. Fournier first described the saber-scabbard shin. In it the tibial crest is thickened in front and smooth, osteophytic growth replaces the sharp crest. The tibia becomes convex anteriorly.

Fournier and Lannelongue assert that Paget's disease is a very late development of hereditary syphilis. Hauduroy[3] reports a case which suggests inherited syphilis. Some observers even believe that acquired syphilis may be causal. We know that some men with acquired syphilis have developed Paget's disease, but that would only go to show that syphilis did not protect a man against Paget's disease, and *vice versa*. An argument which

[1] Medical Clinics of North America, September, 1917.
[2] New York Med. Jour., October 19, 1918.
[3] Plus Ultra, Madrid, abstracted in Jour. Am. Med. Assn., 1919, vol. lxxiii.

counts against a syphilitic origin is that horses and chickens, which cannot take syphilis, may develop a malady which has been thought to be identical with osteitis deformans, although the identity of this malady has been disputed on the ground that it involves the epiphyses, while in Paget's disease of man the diaphyses are chiefly affected.

X-ray reports do not identify the bones of Paget's disease as those of tertiary syphilis.

Burnier[1] discusses late hereditary bone syphilis in its resemblance to Paget's disease. He observed a case of syphilitic deformity of the tibia appearing late, that is, at the age of fifty-one years. When fifty-six years of age the man came into the hospital for scabies and the deformity of his left tibia was found. He said that five years before he had had during five months pain in the upper part of that bone. He thought that the pain was rheumatic. It was so severe that for two months he could not walk. Later he noticed a painless swelling at the upper end of the tibia and found that the leg was shorter than the other and that walking caused pain. The tibia was bowed anteriorly and shortened by 2 cm. There was hypertrophy of the entire bone. The anterior border was blunt and the finger of the surgeon discovered many nipple-like protuberances. No other bony deformity could be discovered and no dental or visceral signs of hereditary syphilis were evident. The man had three children living and well and had never had a chancre. The Wassermann was subpositive. In this case there were certain classical signs of hereditary syphilis, but certain other common signs were absent. The author states that a classical sign in inherited syphilis is the curved and thickened tibia. The tibia is, in fact, the revealer (l'os révélateur par excellence) of hereditary syphilis. We would call attention to the fact that it is the belief of most syphilographers that hereditary syphilis does not cause periostitis late in life.

Burnier pointed out that deformity of the tibia is present in one-fifth of all cases of hereditary syphilis. In the case reported it is interesting to note that there was a massive hyperostosis in one of the diaphyses.

[1] Annales des maladies vénériennes, Paris, 1918, xiii, p. 332.

Leclere, Gangolphe and Bertoye[1] make an important statement bearing on the estimation of the presence of syphilis in supposed Paget's disease. They state that a feeble Wassermann does not count and that of one hundred non-syphilitics of whom they made an examination thirty-nine gave a feebly positive reaction. In their case there was enlargement of the lower third of the left tibia, thickening of the right tibia and curving of both bones. Iodide of potash quieted the painful symptoms of the left leg, but the authors do not consider this a sufficient reason for claiming a syphilitic origin for the condition because the hyperostoses have not diminished in size in spite of the administration of iodide.

Gangolphe in this article remarks that Paget's disease is a hyperostosis, that syphilis, hereditary or acquired, is a process of destruction and that joints are often invaded in syphilis, but are not invaded in Paget's disease. I would state as a comment upon Gangolphe's statement that cases have been reported in which arthritis deformans was associated with osteitis deformans. Gangolphe goes on to point out that syphilitic lesions of the cranial bones are ulcerative and destructive, while Pagetic lesions of the cranial bones consist of hyperostosis and are never destructive. A natural comment on this statement is that osteophytic growths do occur in syphilis, for instance, Parrot's nodes. Gangolphe continues: In syphilis bones break without bending. In Paget's disease bones bend without breaking. I would comment on this remark of Gangolphe that spontaneous fracture occasionally, though very rarely, does occur in Paget's disease. Gangolphe asserts that a saber-scabbard type of tibia is not to be regarded as characteristic of syphilis, as it is met with in widely different conditions. Some few observers claim that patients suffering from Paget's disease have been benefited by specific treatment.

Roban has pointed out an important fact, viz.: that the chemical composition of syphilitic bone is different from that of Pagetic bone. I do not believe that it is always possible to tell if a case is one of Paget's disease or of syphilis.

[1] Lyon méd., June 30, 1914, vol. cxxiii.

Take the case reported by Saunders: The man had a positive syphilitic osteitis, and yet during the previous five years had noticed that his head was becoming larger and that his legs were bending. Now the question is, Was this a syphilitic disease of the bending bone and Paget's disease of the skull or was it an instance of Paget's disease? We conclude that there is much testimony but little evidence that syphilis is causal.

When we examine the history of a man with Paget's disease we often find that he has diseased teeth or that he has had frequent attacks of quinsy, etc.; but we often find the same thing in people who have nothing else the matter with them. I suppose if the history of a multitude of houses could be obtained, and if we should find that several cases of Paget's disease in the course of forty or fifty years had been in a single house, that some would speak of Pagetic houses just as some observers do of cancer houses, and as we might, with equal propriety, speak of apoplexy houses or profanity houses. Of course, bacterial infection has been suggested as a cause. In this connection the two cases reported by Stivelman and Ray are interesting.[1] In each case there was marked eosinophilia.

Several Italian scientists (Morpungo, Arcangelli and Fiocca) in studies of osteomalacia and osteitis deformans produced osteomalacia in animals experimentally and claim to have found a diplococcus in the bones. They also claim to have found an identical diplococcus in the iliac bones of a woman who had osteomalacia. They prepared a vaccine and claimed that it benefited thirteen cases of osteomalacia and one case of Paget's disease. It will be noted that these observations regard osteomalacia and osteitis deformans as different exhibits of the same disease, and they think the same of rickets. They claim to have found the identical organism in the tibia of a woman with Paget's disease, and they prepared a vaccine from it. They gave this vaccine to four cases of Paget's disease and assert that two of them were notably improved and that one showed some benefit. In two of our cases I removed a bit of tibia. Doctor Ellis carefully examined

[1] New York Med. Jour., Oct. 19, 1918, cviii, p. 678.

the pieces of tibia excised and was unable to find any bacteria. Some observers, notably Lancereaux and Richard, not only attached importance to the role of a causal infection, but believe that arthritis deformans and osteitis deformans are identical. In this view I believe they stand alone.

A neurotrophic origin has been asserted, also degeneration of the nerves entering the nutrient foramina of bone. Gout has been suggested as a cause.

A view that is widely held at the present time is that increase, absence of or alteration in the character of the secretion of one or more of the ductless glands is responsible for the metabolic changes characteristic of osteitis deformans. We know that the ductless glands have immense influence on bone metabolism, and we know how diseases of the pituitary may be responsible for acromegaly, gigantism and the bone lesions found in cretinism. That the thyroid gland influences growth in a cretin has been proved, and it also has been asserted that this gland influences development in a healthy person. We know the great importance of the parathyroids in calcium metabolism. In our paper we set forth some interesting studies in metabolism. In one of our reported cases the *x*-ray showed calcification of the pineal gland, a gland that is, in all probability, influential in affecting the growth of an individual in early life. Perhaps osteitis deformans may be due to disease of the pineal gland after ossification of the epiphyses, causing a perverted internal secretion, which may act directly upon the bones or indirectly upon the pituitary gland. As a matter of fact, however, calcification of the pineal gland normally occurs after the gland ceases to be functionally active.

Symptoms of the Disease. In most cases the first symptom is pain. This pain after lasting for some months is liable to cease. It is occasionally associated with tenderness, may be so severe as to prevent walking and may be continuous or paroxysmal; it is aggravated by effort and is usually mistaken for rheumatism. In some cases the pain has continued throughout. In a minority of cases there has been no pain whatever. The pain is complained of in the lower extremities, not the head, although head-

aches may occur. In some few cases the leg pain is accentuated at night. It is occasionally described as severe and aching. While it may appear months before any bone disease is noticed, it may not arise until the bone begins to bend. In several reported cases throughout the course of the disease there has been no complaint of pain. In one case the patient suffered from sudden pain in the back while lifting and had to remain in bed for a week, then got better, but soon after pain developed in the lower extremities.

Severe pain will cause limping even previous to the onset of deformity. The deformity of the head is usually striking and characteristic. In the picture that I shall show you of an unsuspected case the head is characteristically deformed. The forehead is large and prominent—more than Websterian—the face is too small for the cranium and is overshadowed by it. The head is a triangle with the base above, and we were able to make the probable diagnosis of Paget's disease as we walked through the doorway of the ward. In this woman the enlargement is symmetrical. In two cases previously referred to it was asymmetrical. Sometimes the head may become enormous. This is due to great thickening of the cranial bones. The greatest thickening is of the outer table, although the inner table is also somewhat thickened.

It is not only the convexity of the skull which undergoes change. The studies of Andre Leri[1] show that the face and base of the skull also suffer. There may be thickening of the sphenoid bone and of the basilar process of the occipital bone. The protuberance seems to project into the cranial cavity, so as to resemble a convex base. His studies show that the sella tursica may be flattened and shallow and the foramen magnum and the cerebellar fossæ diminished in size. Of course, the degree of these deformities varies. Leri says that the changes of the base are twofold, hypertrophy and deformity, due to softening. Palpable deformity may take place in the circumference of the foramen magnum and in any

[1] Étude de la Base du crâne Dans la Maladie de Paget, Nouvelle Iconographie de la Salpêtrière, Paris, 1913, xxvi, 452.

part of the base of the skull. The wings of the sphenoid are also affected. Prominences become longer and broader and the orbital vaults become thickened and cease to be transparent. It has been previously pointed out that involvement of the skull below the supraorbital margin is unusual, but may occur, and when it does occur in the facial part proper we are apt to call the case leontiasis ossea. Abbe[1] has shown that the jaws are not infrequently affected and that dentists should be on the lookout for it. He says that in fourteen cases four had jaw involvement.

Involvement of the face (leontiasis) may cause pain and loss of function. In a case I saw in Blockley blindness resulted. The basal skull changes may be responsible for headache, eye changes and palsy. It is hard to understand how these skull changes could be responsible for mental trouble, but mental trouble has been reported.

The deformity of the long bones has been previously discussed. It has been said that the bones of the upper extremity may be involved as early as the bones of the lower extremity, but certain it is that the early involvement is not so often noticed. It is noticed certainly and early in the lower extremities because of the great bending which occurs. The bones of the upper extremity also bend, but not nearly so much as those of the lower. Usually one bone inaugurates the bending, either the tibia or the femur. This bending may be accompanied by pain, may be preceded by pain or may be followed by pain. There is not only bending, but there is also twisting. The bending shortens the extremity and causes a marked limp. The vertebræ are frequently involved. Their involvement causes a marked cervicodorsal kyphosis, and the kyphosis causes the patient a loss in height, often a great loss. The chest is deformed and the pelvis is often broadened. The chest deformity may be responsible for cough, chest pain and dyspnea. When the disease is fully developed the person presents the perfectly characteristic symptoms shown in the well-known pictures of Paget. The patient looks considerably like a gorilla. The arms are long, compared to the

[1] Jour. Am. Med. Assn., Feb. 9, 1918, lxx, p. 371.

legs and approach the ground. This approach to the ground is due to loss in height, chiefly by vertebral curvature, but partly by the curved legs.

The patient not only stoops greatly but is markedly round-shouldered. Paget points out that the head is held forward with the chin raised. It seems too heavy for its support. The chest is sunk toward the pelvis, the belly is pendulous, the curved lower extremities are held wide apart, the knees are bent, the ankles are overhung by the legs and the toes are turned out. The movements are slow and awkward. A square cranium completes the picture. The patient walks in a tremulous and uncertain manner and requires a cane

What of fractures in Paget's disease? They are not common, but now and then a case shows a history of a fracture during the disease. In some cases fractures have occurred in each of the extremities. In Auffret's case four fractures occurred during the existence of Paget's disease. There was fracture of the anterior tuberosity of the right tibia. Four years later there was fracture of the left humerus. Fracture of the right forearm occurred a few months afterward and a second fracture of the left humerus was sustained three years later. It is worthy of note that a fracture occurring in a Pagetic bone undergoes repair just as rapidly and just as soundly as it does in a normal bone. It is also true that surgical wounds of bone repair perfectly well. Abbe notes this especially in operations on the jaw.[1]

Tumor Formation. In 159 cases of Paget's disease, fifteen showed multiple sarcoma. Sarcoma in one case developed after the disease had existed twenty-two years. It is not known whether the origin of sarcoma is a mere coincidence or the result of some causal tendency on the part of the Pagetic processes. The very irregular, incoördinate and uncontrolled activities of the cells might be regarded as predisposing to sarcoma, although in one case reported by Paget the sarcoma arose in a bone which did not exhibit the changes of osteitis deformans. In most cases in which it has arisen it has been in bones the seat of Pagetic changes.

[1] Jour. Am. Med. Assn., 1918, lxx, p. 371.

Von Recklinghausen's disease (tumor forming osteitis deformans, osteitis fibrosa cystica) was considered by its discoverer to be a distinct malady, although a relation of Paget's disease. Some distinguished observers regard the two conditions as identical, and Boit asserts that Virchow's disease (leontiasis ossea) is identical with von Recklinghausen's disease.

Pfeiffer collected forty-nine cases of osteitis fibrosa cystica, the majority being in the second decade of life. Seventy-one per cent of them occurred before the twentieth year; 83 per cent before the thirtieth year and 94 per cent before the fortieth year—a very striking difference compared with the age instance of Paget's disease. The metaphyses of the long bones are chiefly involved and there is a very strong tendency to fracture. *X*-rays show the appearance of cysts.

Kolisko believes that osteitis fibrosa is identical with Paget's disease. As Ewing says (*Neoplastic: Diseases*): "In both the transformation of bone-marrow into fibrous tissue may be followed by regressive changes leading to bone cysts or to progressive changes giving rise to giant-cell sarcoma of slight malignancy."

Metabolic Changes. It seems probable that metabolism studies may eventually give important indications. The studies in two cases reported by Da Costa, Funk, Bergeim and Hawk indicated a pronounced retention of calcium, magnesium and phosphorus and a large elimination of sulphur. In advanced osteitis deformans the first stage in the new formation of bone or osteoid tissue may be the production of a highly sulphurized organic matrix, which is transformed gradually by calcification processes and which is accompanied by the deposition of calcium, magnesium and phosphorus in this matrix. In the course of this calcification procedure we may suppose that a certain quota of the sulphur of the matrix is replaced by the other elements mentioned, a process which must entail the retention of calcium, magnesium and phosphorus and an accompanying increased elimination of sulphur. The metabolic picture of advanced osteitis deformans is to a certain degree the reverse of that seen in osteomalacia. The two patients on whom these metabolic tests were made were on a diet high in calcium and phosphorus.

My distinguished colleague, Professor Hawk, in a personal communication, writes: "We are not certain that these findings are typical of all stages of osteitis deformans, and undoubtedly they do not tell the whole story, as there is not simply an increased formation of normal bone as appears to be true in acromegaly, but a resorption and then reformation. There is clearly an abnormality in the calcification process, but the cause and exact nature of it can only be elucidated by further work. We noted that the urinary calcium excretion was very low and similar to that found by us in a man after thyroparathyroidectomy as well as in certain stages of rickets, but its significance we have been unable to determine. You will recall that the metabolic picture in osteitis deformans is the opposite of that found in osteomalacia, in which disorder we find an increased output of calcium and phosphorus and retention of sulphur."

The duration of osteitis deformans is altogether uncertain, though it continues for many years unless the person is taken off by an intercurrent malady. Many cases of very long duration have been published.

The disease is totally incurable and there is no proof of definite benefit from any plan of treatment that has so far been suggested. It has been claimed that great pain in one of the long bones may be relieved by division of the periosteum and trephining the bone. If the patient was in much suffering I would consider this experiment safe and justifiable. In leontiasis it may be advisable to remove masses of bone.

We reach the following conclusions about Paget's disease:

1. That although Paget's disease appears to be a distinct malady it certainly has close relationships to osteomalacia and to von Recklinghausen's disease. Metabolic studies may perhaps settle the question of pathological relationship, identity or diversity. If it is found that very early cases of Paget's disease show metabolic changes like those of osteomalacia we may assume identity. Late cases of Paget's disease show metabolic changes the reverse of those found in osteomalacia.

2. Leontiasis ossea and hyperostosis cranii are probably identical with Paget's disease.

3. It has been shown definitely, in opposition to what was once stated, that the jaws may be affected in Paget's disease and may be affected to a degree requiring surgical operation. This involvement, however, is the exception rather than the rule.

4. Fractures are uncommon but may occur, and when they do occur they undergo repair as rapidly and as frequently as do fractures in normal bones.

5. Operations may be performed on Pagetic bones as on any other bone without any increased probability of infection and with equal surety of satisfactory repair.

6. The disease is far more common than has previously been supposed. Many cases never come for advice; many are overlooked; many seek advice because of some other malady; and the condition is often found by accident. In fact it seems scarcely worth while in future to report individual cases of Paget's disease unless there be something in the case record which is particularly interesting, remarkable, significant or important.

7. When the disease starts in one bone it usually appears in a few months in another bone or other bones, but it may remain limited for a long time to a single bone. In one reported case it remained limited to the tibia for six years.

8. It tends to involve bones symmetrically, but by no means always does so, and it has nothing like the symmetrical regularity of acromegaly.

9. There is a definite tendency to tumor formation resulting probably from the irregular, incoördinate and uncontrolled cellular activities.

10. The usual early diagnosis is chronic rheumatism, hence any person who is supposed to have chronic inflammation of a bone or a joint should be subjected to a careful examination.

11. The *x*-ray is of the first importance in diagnosis. It demonstrates cases of Paget's disease long before there is deformity. All patients with bone pains should have *x*-ray pictures taken.

12. It seems to be certain that Paget's disease is not due to

acquired syphilis and almost certain that it is not due to inherited syphilis.

13. We do not know the cause; we simply guess that it may be due to disease of one or more of the ductless glands or to a lapse of harmony between certain of the ductless glands.

14. Further studies of the metabolic changes may perhaps give us information of the first importance. They certainly should be prosecuted by skilful workers.

15. It is an interesting thought that Paget's disease may destroy many of the registered Bertillon measurements of a criminal, and were a criminal to burn his finger pulps so as to destroy the lines, he might, with the assistance of Paget's disease, escape identification. Suppose, for instance, he was a foot shorter than his registered measurement, his head was much greater in circumference and that the length of his lower extremities had altered. There is no real fear, however, that this disease can be a protector of crime. It is not sufficiently common, it is too slow in action, it cannot be acquired at will and the criminal would have to destroy destroy his finger lines also.

16. There is no known treatment of any value. It has been stated by one observer that iodide of potassium may relieve bone pain and by another that trephining the bone may do the same. In leontiasis ossea it is often justifiable to remove masses of bone.

NOTE.—For origin of references above given by name of author only, as well as for extensive bibliography on Paget's disease consult: Da Costa, Funk, Bergeim, and Hawk in publications from the Jefferson Medical College and Hospital, 1915, vi, p. 1–44.

ANNUAL REPORT OF THE LIBRARY COMMITTEE FOR 1920

MR. PRESIDENT: In accordance with the Ordinances and By-Laws of the College, I herewith submit the following report of the Library Committee for the year 1920:

Total number of volumes in the Library, including the bound volumes and 16,115 unbound "Reports" and "Transactions"	125,586
Number of unbound "Theses" and "Dissertations" .	9,965
Number of unbound pamphlets	110,443

Included in the above are 3,785 volumes known as "Reserves," consisting of second copies of some of the more important periodical publications; also 3,014 volumes more or less incomplete.

The duplicates which are not included in the above total, number 7,217 at this date.

The following table shows the number of volumes in the various divisions of the Library:

	Bound.	Incomplete and unbound.	Total.
General Library . . .	88,937	2,967	91,904
Lewis Library	13,700	44	13,744
On permanent deposit:			
S. D. Gross Library . .	3,603	3	3,606
Library of the Obstetrical Society of Philadelphia	217	0	217
			109,471

Received during the year from all sources, 4,222 volumes, 11,849 pamphlets and 12,661 numbers of various periodicals.

Divided as follows:

	Volumes.	Pamphlets.	Journals.
General Library	3,436	11,484	12,588
Lewis Library	31		
S. D. Gross Library	24		
By purchase from General Account	328		
In exchange	403	365	73
	4,222	11,849	12,661

Accessions (including 177 volumes of "reserves"):

General Library	2,731
Lewis Library	31
S. D. Gross Library	24
	2,786

Total increase in number of volumes for the year: 2,786.

Photographs received in response to requests sent out during the past year and voluntary gifts:

Fellows of the College, 22. Other than Fellows, 77.
For the "War Album," Fellows of the College, 19.
Total number of portraits listed, 9,701.

The individual "donors" for the year ending November 1, 1920, number 428; this represents 1,026 distinct presentations. Each gift is duly acknowledged and properly recorded.

The following list shows individual gifts of more than twenty-five volumes, and the number of volumes presented by the various publishing houses:

	Volumes.
Dr. H. W. Stelwagon	571
Mrs. W. T. Williams	226
Dr. Frederick P. Henry	167
Dr. Richard H. Harte	99
Dr. George M. Piersol	73
Dr. T. V. Crandall	67
Dr. Charles W. Burr	55
Dr. William W. Keen	51
Dr. Herman B. Allyn	47
Dr. Hobart A. Hare	37
Dr. Stricker Coles	36
The Misses Kirkbride	33
Dr. James C. Wilson	26
Henry Phipps Institute	25

From the publishing houses of:

P. Blakiston's Son & Co.	14
F. A. Davis Company	19
Lea & Febiger	13
J. B. Lippincott Co.	13
W. B. Saunders Company	50
William Wood & Company	4

The Library is indebted for large gifts of pamphlets and unbound periodicals to the following donors:

Dr. A. P. C. Ashhurst
Dr. Charles Baum
Messrs. P. Blakiston's Son & Co.
Dr. Charles W. Burr
Dr. Burton Chance
Dr. T. V. Crandall
Dr. Edward P. Davis
Dr. A. A. Eshner
Dr. Clifford B. Farr
Dr. John V. Fisher
Dr. Charles H. Frazier
Dr. J. P. Crozer Griffith
Dr. S. McC. Hamill
Dr. Hobart A. Hare
Dr. J. C. Hatfield
Dr. F. P. Henry
Dr. Addinell Hewson
Dr. John H. Jopson
Dr. William W. Keen
Dr. H. R. M. Landis
Messrs. J. B. Lippincott Company
Dr. Charles K. Mills
Dr. S. W. Moorhead
Dr. Charles A. O'Reilly
Dr. Maurice Ostheimer
Dr. Francis R. Packard
Dr. Richard M. Pearce
Henry Phipps Institute
Dr. George M. Piersol
Messrs. W. B. Saunders Company
Dr. George E. de Schweinitz
Dr. H. W. Stelwagon
Dr. C. F. Taylor
Dr. H. R. Wharton
Dr. James C. Wilson
Dr. C. S. Witherstine
Dr. Frank Woodbury
Dr. M. W. Zimmerman

940 new publications were added to the Library during the past year; 30 of these works were written or edited by Fellows of the College.

10 volumes were presented by the following authors or editors:

Dr. J. W. Gilbert
Dr. Hobart A. Hare (Editor)
Dr. H. R. Harrower
Dr. M. B. Hartzell
Dr. Thomas McCrae
Mr. B. G. Teubner
Dr. James C. Wilson

5 volumes were sent by the publishers at the request of the following authors or editors:

Dr. A. P. C. Ashhurst
Dr. Thomas S. Cullen
Dr. Ross Hall Skillern
Dr. James C. Wilson

Summary of the "Funds:"

	Volumes purchased.	Cost.
Henrietta Rush Fales Baker Fund	77	$368.37
Luther S. Bent Fund	33	38.22
William T. Carter Fund	55	151.22
Gerardus Clarkson Fund	7	6.14
Francis X. Dercum Fund	78	163.56
Louis A. Duhring Fund	26	60.63
John D. Griscom Fund	111	401.50
William F. Jenks Fund	93	422.10
Oliver A. Judson Fund	13	40.55
William V. and John M. Keating Fund	27	39.44
William W. Keen Fund	45	114.06
Library Endowment Fund	82	373.35
Horace Magee Memorial Fund	275	1,786.71
J. Ewing Mears Fund	73	213.77
Charles K. Mills Fund	2	14.92
Weir Mitchell Fund	13	125.84
John H. Musser Fund	15	12.41
Elizabeth K. Newcomet Fund	30	53.10
William F. Norris Fund	27	93.54
Charles A. Oliver Fund	16	33.71
Philadelphia Medical Society Fund	1	7.43
Lewis Rodman Fund	69	225.46
Douglas Stockton Warren Fund	39	72.14
John F. Weightman Fund	8	39.92
Caspar Wistar Fund	43	177.85
	1,258	$5,035.94

Special Accounts:

	Volumes purchased.	Cost.
Fund for completing files of journals	60	$281.52
Fund for rare and valuable books	246	5,868.31
S. D. Gross Library Account	21	87.44
	327	$6,237.27

George B. Wood Fund—Library supplies, stationery, etc., Expended $360.56.

Morris Longstreth Library Fund, on account of salaries, expended $1,002.41.

Catalogue Endowment Fund, expended on account of salaries, $42.50.

Louis A. Duhring Fund—General purposes of the Library, Expended $14,497.59.

	1920.	1919.	Increase.
Books bound	1,914	1,257	657

	Visitors.	Fellows.	Total.
Use of the Library . . .	3,969	2,208	6,177

The Library has been kept open two evenings each week and on the six minor legal holidays, for the same hours and period of time, as during the past year.

Evenings.	Visitors.	Fellows.	Total.
77	375	193	568
Legal holidays	49	28	77

The above figures are included in the total given for the year.

	1920.	1919.	Increase.
Number of books consulted in the Library	19,021	13,008	6,013

The number of books reported as "consulted in the Library" includes only those supplied on demand. Readers have access to the bound volumes of periodicals and works of reference kept on the shelves in the Reading Room, and the Fellows have access to the Book-Stacks. There are, therefore, a great many volumes consulted of which no accurate record can be kept.

	1920.	1919.	Increase.
Number of books taken out .	3,683	1,956	1,727

Use of Study-Rooms: Average number of rooms in use throughout the year: 6. Greatest number in use in any one month: 7. Daily average of the number of volumes in use in these rooms: 127.

	Works.	Volumes.	Cards written.	Printed cards revised and filed.
Cataloguing . . .	1,135	1,336	5,716	2,643

All the books added to the shelves during the past year and 412 of the more important pamphlets have been catalogued and shelf-listed; and all bound volumes, including periodicals, transactions and reports, have been accessioned.

The Revision of the Catalogue shows that some 4,073 cards have been revised and rewritten.

6,143 unbound pamphlets and reprints have been subject-headed and arranged alphabetically by subject and by author under the subject. The binding of pamphlets by subjects is still held in abeyance on account of the excessive charges occasioned by the labor conditions.

We have listed November 1, 1920, 1,278 current periodical publications, including "Transactions" and "Reports" obtained through the following sources:

	American.	Foreign.
Endowment Funds	18	231
By purchase from General Account . . .	88	399
In exchange	64	99
Editors	107	22
Publishers	23	2
In addition, current numbers of periodicals have been received, at stated intervals, through the courtesy of the editors and editorial staff of the American Journal of the Medical Sciences Therapeutic Gazette	47	31
	347	784
Reports not included in the above . .	125	22
	472	806

The actual number of current periodicals received during the year, including new subscriptions (9 American and 10 Foreign), total 768. This is an increase of 123 over the previous year and made up, to a large extent, by German and Austrian journals.

We are still carrying our lists intact, and changes are made only when official notification is received from our Agents or from the journals themselves. This plan it seems advisable to continue for some time to come, under existing conditions.

The following is a list of the foreign schools of medicine with which we exchanged publications prior to the war; for the present, as in the case of the periodicals, it seems advisable to keep this list intact:

University of	Amsterdam	University of	Königsberg
"	Basel	"	Lausanne
"	Berlin	"	Leiden
"	Bern	"	Leipzig
"	Bonn	"	Liège
"	Breslau	"	Lund
"	Erlangen	"	Marburg
"	Geneva	"	Rostock
"	Giessen	"	Strassburg
"	Göttingen	"	Upsala
"	Greifswald	"	Utrecht
"	Halle	"	Würzburg
"	Heidelberg	"	Zurich
"	Keil		

Faculty of Medicine of Bruxelles
" " Paris
" " Toulouse
" " Yucatan

We have heard, during the past year, from Amsterdam, Basel, Bern, Leiden, Paris and Utrecht. 322 dissertations and 285 theses of the Faculté de Médecine de Paris, bound in 30 volumes, covering the School year 1918–1919, have been added to our collection.

We have received in cash from the sale of duplicates for the current year ending November 1, 1920: $367.06.

During the year we have distributed books and journals, on exchange account, to the following:

Boston Medical Library
University of Illinois
University of Pennsylvania

And we have received exchanges from:

Boston Medical Library
Medical Library Association
New York Public Library

With the aid received from exchanges and purchases made with funds appropriated for the purpose by the Library Committee, we have, since November 1, 1919, completed the files of the following journals:

Clinical Journal, London
Morphologische Arbeiten, Jena

Amount of fines collected from November 1, 1919, to November 1, 1920: $67.05.

The following is a list of the rare medical books and works of special interest received during the past year:

Incunabula

(Total number of incunabula at this date, 286 Titles, 268 Volumes)

Aben Ezra. [Liber de nativitatibus.] Venetiis, Erhardus Ratdolt de Augusta, 1485. [Hain 21.]

*Contains also—Bate, Henricus. Magistralis compositio astrolabij hanrici bate.*** Extremely rare first edition.*

Fund for Rare Books.

Albertus Magnus. De coelo et mundo. Venetiis, Johannes et Gregorius de Gregoriis de Forlivio, 1490. [Hain 511.]

Fund for Rare Books.

Albertus Magnus. [Libri IV meteorum.] [Venetiis] Raynaldus de Novimagio, 1488. [Hain 513.]

Fund for Rare Books.

Albertus de Saxonia. Quaestiones in Aristotelis libros de coelo et mundo. Venetiis, Bonetus Locatellus, 1492. [Hain 576.]

Fund for Rare Books.

Aristoteles. [De natura animalium.] Theodori graeci thessalonicensis praefatio in libros animalibus aristotelis. Venetiis, Johannes de Colonia et Johannes Manthen de Gherretzem, 1476. [Hain 1699.]
Fund for Rare Books.

Arnoldus de Villa Nova. De virtutibus herbarum s. Avicenna. Vicentiae, Leonardus Achates et Guilielmus de Papia, 1491. [Not in Hain.]
Fund for Rare Books.

Avienus, Rufus Festus. [Opuscula.] Venetiis, Antonius de Strata Cremonensis, 1488. [Hain 2224.]
Fund for Rare Books.

Baptista Mantuanus. [De patientia aurei libri tres.]*** Basileae, Johannes Bergmann de Olpes, 1499. [Hain-Copinger 2407.]
Contains reference to the discovery of America.
Fund for Rare Books.

Bate, Henricus. Compositio astrolabii. [Hain 21.]
In—Aben Ezra. Liber de nativitatibus, 1485, *ff.* 21–30.
Fund for Rare Books.

Bergomensis, Jacobus Philippus. Supplementum chronicarum. Venetiis, Bernardinus Rigus de Novaria, 1492. [Hain 2809.]
Contemporary manuscript notes.
Fund for Rare Books.

Beroaldus, Philippus. Declamatio lepidissima ebriosi scortatoris aleatoris de vitiositate disceptantium. Bononiae, Benedictus Hectoris, 1499. [Hain 2965.]
Fund for Rare Books.

Beroaldus, Philippus. [Opusculum eruditum.] Philippi Beroaldi Opusculum: Quo continentur Declamatio Philosophi Medici Oratoris de excelle[n]tia disceptatu. Et libellus de optimo statu: & principe. Bononiae, Benedictus Hectoris, 1497. [Hain 2963.]
Fund for Rare Books.

Burley, Walter. De vita et moribus philosophorum et poetarum. [Coloniae], Arnoldus Therhoeren, 1472. [Hain 4122.]
Profusely rubricated.
Fund for Rare Books.

Dionysius de Leuwis. [Specula omnis status humanae vitae.] Norimberges, Petrus Wagner, 1495. [Hain-Copinger 6242.]

The only edition of this work printed in the 15th century.

Fund for Rare Books.

Ficinus Florentinus, Marsilius. [De triplici vita.] Florentiae, Antonius Bartholomaei Mischominus, 1489. [Hain 7065.]

Fund for Rare Books.

Galen, Claudius. De facile acquisibilibus. [Reichling. suppl. no. 197.]

In—Tractatus de urinis. Circa 1490. *ff.* 11–17.

Fund for Rare Books.

del Garbo, Dinus. Compilatio emplastrorum et ungentorium. Ferrariae, Andreas Bellfortis Gallus, 1489. [Hain 6170.]

Fund for Rare Books.

del Garbo, Dinus. [Expositio super tertia et quarta et parte quinte Fen Avicennae.] Ferrariae, Andreas Bellfortis Gallus, 1489. [Hain 6166.]

Fund for Rare Books.

Glanvil, Bartholomaeus. Van den proprieteytan der dingen. Harlemi, Jacob Bellaert, 1485. [Hain 2522.]

Dutch text. Lacks 14 *ff. & 3 blanks. The only work giving the name of Bellaert as a printer.*

Fund for Rare Books.

Guido de Monte Rocherii. [Manipulus curatorum.] [Basilae, Martinus Flach, circa 1475.] [Hain 8186.]

Fund for Rare Books.

Guido de Monte Rocherii. Manipulus curatorum. Venetiis, Simon Bivilaqua Papiensis, 1495. [Hain 8211.]

Fund for Rare Books.

Herbarius i[n] latino cu[m] figuris. [Louvain, Jan Veldener, circa 1484.] [Copinger II, 2916.]

Excessively rare third Latin edition of a famous herbal.

Horace Magee Memorial Fund.

Jacobus Forliviensis. [Expositio in primum libros canonis Avicennae.] [Venetiis, Octavianus Scotus per Bonetum Locatellum, circa 1495.] [Hain 7245.]

Fund for Rare Books.

Jamblichus. [De mysteriis Aegyptiorum, Chaldaeorum, Assyriorum, et alia opuscula.] Venetiis, Aldus Manutius, 1497. [Hain 9357.]

Fund for Rare Books.

Manilius, Marcus. Astronomicon. [Venetiis, circa 1490.] [Hain 10702.]

Fund for Rare Books.

de Novimagio, Rudolphus. [Legenda Alberti Magni.] [Coloniae, Johannes Guldenschaff, circa 1483.] [Copinger 4443.]

Very rare.

Fund for Rare Books.

Petrus de Abano. Tractatus de venenis. Romae, [Stephannus Plannck] 1484. [Hain 11.]

Fund for Rare Books.

Plinius, Cajus Secundus. [Historia naturalis.] Parmae, Andreas Portilia, 1481. [Hain 13094.]

Fund for Rare Books.

Rolevinck, Werner. Fasciculus temporum. Argentorati, Joh. Pryss, 1488. [Hain 6937.]

First record of the invention of printing.

Fund for Rare Books.

Sabellicus, M. Antonius Coccus. [Rerum Venetarum.] Venetiis, Andreas Toresanus, 1487. [Hain 14053.]

First edition.

Fund for Rare Books.

Salemo, Bishop of Constance. Glossae ex illustrissimis collectae auctoribus. Augustae Vindelicorum, Monasterium SS. Ulrici et Afrae, 1474. [Hain 14134.]

First and only edition of a very important and interesting work from a famous monastic press which produced only a few books.

Fund for Rare Books.

Schedel, Hartmann. [Liber chronicarum.] Norimbergae, Antonius Koburger, 1493. [Hain 14510.]

First German edition of the famous Nuremberg Chronicle.

Fund for Rare Books.

Tractatus de Urinis. Et liber Galieni; De facile acquisibilibus. [Argentorati, Jordani de Quedlinburg, circa 1490.] [Reichling, suppl. no. 197.]

Excessively rare.

Fund for Rare Books.

Wernherus. Abbas Monasterii S. Blasii. Liber deflorationum seu excerptorum ex diversis partibus. Basileae [Nicolaus Kessler] 1494. [Hain 16153.]

Fund for Rare Books.

Works of Special Interest

Agrippa, Henricus Cornelius. De occulta philosophia. Libri tres. [Cologne, Soter] 1533.

Rare first edition.

Fund for Rare Books.

Aguilonius, Franciscus. Opticorum libri sex philosophis juxta ac mathematicis utiles. Antuerpiae, ex off. Plantiniana, 1613.

Extremely rare first edition of an important work.

Fund for Rare Books.

d'Ailhaud, Jean Gaspard. Traité de la vraie cause des maladies et maniere la plus sure de les guérir par le moyen d'un seul reméde. Carpentras, Quenin, 1576.

Fund for Rare Books.

Alcinous. De doctrina Platonis liber.*** Totius Platonis philosophie brevissimum juxta ac pulcherrimum compendium. Basileae, Isingrinus, 1532.

Fund for Rare Books.

Alcyonius, Petrus. Medices legatus sive, de exilio libri duo.*** Lipsiae, Gleditsch, 1707.

First edition.

Fund for Rare Books.

Alexis Pedemontanus. Secretes, containing excellent remedies against diverse diseases*** trans.*** by Willyam Warde. London, Kyngston, 1578–1580.

Fund for Rare Books.

Alsted, Johannes Henricus. Trigae canonicae, quarum prima, est dilucida artis mnemologicae, vulgò menorativae, traditae à Cicerone, Quintiliano, aliisq; oratoribus qua priscia, quà recentibus, explicatio et applicatio.*** Francofurti, Richter, 1612.

Rare first edition.

Fund for Rare Books.

ab Altomari, Donatus Antonius. Omnia, quae hucusque in lucem prodierunt, opera, nunc primum im unum collecta.*** Lugduni, Rouillij, 1597.

Fund for Rare Books.

Ampsingius, Joannes Assuerus. Dissertatio jatromathematica in qua de medicinae et astronomiae praestantia.*** Rostock, Pedanus, 1618.

Rare. First edition published in 1602.

Fund for Rare Books.

de Angelis, Alexander. In astrologos coniectores libri quinque. Secundo prodeunt.*** Rome, Zannetti, 1615.

Very scarce work on medical astrology.

Fund for Rare Books.

Argolus, Andreas. De diebus criticis et aegrorum decubitu libri duo. Patavii, Frambottus, 1652.

Fund for Rare Books.

Argolus, Andreas. Ptolemaeus parvus in Genethliacis junctus Arabibus. Lugduni, Vilort, 1652.

Rare first edition of suppressed book on astrology.

Fund for Rare Books.

Aristoteles, with commentaries of Stapulensis. Introductio in libro physicorum. Paraphrasis octo physicorum.*** De generatione et corruptione.*** De sensus et senato,*** De memoria et reminiscentia.*** De sommo et vigilia.*** De longitudine et brevitate vita.*** Paris, Colines, 1521.

Numerous woodcuts and diagrams in text. Very fine copy in 17th century calf, with coat of arms of Leonor d'Estampes de Valency, Archbishop of Rheims. Rare. Not in Brunet, Graesse, Hoffman and Schwab, but fully described by Ranouard. Only a later edition, 1528, in the Br. Mus. Jacobus Faber, Stapulensis, a great French Scholar.

Fund for Rare Books.

Aristoteles. Libri physicorum octo *** Auerroeq[ue] eius exactiss. interprete ac M. Anto. Zimare.*** Lugdini, de Gaubianus, 1520.

Extremely rare and important first edition.

Fund for Rare Books.

Atkins, William. Discourse shewing the nature of the gout.*** London, Fabian, 1694.

Horace Magee Memorial Fund.

Augenius, Horatius. De febribus, febrium signis symtomatibus et prognostico libri septem,*** ab Hilario Augenio.*** Francofurti, Wecheli, 1650.

Fund for Rare Books.

Avicenna. Quarti libri canonis fen prima de febribus. Nova editio. Patavii, de Cadorinis, 1659.

Fund for Rare Books.

Bacon, Francis Lord Verulam. Sylva sylvarum; or A naturall historie. In ten centuries. Published after the author's death, by William Rawley. 2 Ed. London, Lee, 1628.

Contains also his—New Atlantis.

Fund for Rare Books.

Bacon, Roger. Cure of old age, and preservation of youth, shewing how to cure and keep off the accidents of old age; and how to preserve the youth, strength and beauty of body, and the senses and all the faculties of both body and mind. Translated out of Latin *** by Richard Browne. London, Flesher, 1683.

Fund for Rare Books.

Bancroft, Edward Nathaniel. An essay on the Natural History of Guiana, in South America; containing a description of many curious productions in the animal and vegetable systems of that country.*** London, Becket, 1769.

Horace Magee Memorial Fund.

Barclay, John. Icon animorum. Londini, Norton, 1614.

First edition. Presentation copy with signed autograph inscription.

Fund for Rare Books.

Bartholinus, Caspar. Controversiae anatomicae, et affines nobiliores ac rariores. Goslariae, Dunckeri, 1631.

*Contains also his—Institutiones anatomicae corporis humani.*** 1632.

Fund for Rare Books.

Bartholinus, Caspar. Institutiones anatomicae, corporis humani utriusq[ue] sexus historiam et declarationem exhibentes, cum plurimis novis observationibus opinionibus et controversiarum occurrentium decisionibus.*** Goslariae, Dunckeri, 1632.

*Bound with his—Controversiae anatomicae.*** 1631.

Fund for Rare Books.

Bartholinus, Caspar. Institutiones anatomicae.*** ab auctoris filio, Thoma Bartholino, movendo. Lugd. Batav., Hackius, 1641.

Fund for Rare Books.

Bertacchius, Dominicus. De spiritibus libri quatuor. Nec non facultate vitali libri tres. Venetiis, 1584.

First edition.

Fund for Rare Books.

Blancard, Stephen. Praxeos medicae idea nova, in qua origo omnium morborum.*** Amstelodami, ten Hoorn, 1685.

Fund for Rare Books.

Blondel, Franciscus. Thermarum Aquisgranensium, et Porcetanarum elucidatio, et thaumaturgia.*** Aquisgrani, Clemens, 1688.

Fund for Rare Books.

Bonagens, Victor. Decem problemata de peste. Venetiis, Valgrisii, 1556.

Fund for Rare Books.

Borelli, Giovanni Alfonso. Theoricae mediceorum planetarum ex causis physicis deducatae. Florentiae, ex typ. S. M. D., 1665.
Fund for Rare Books.

van den Bossche, Guilielmus. Historia medica, in qua libris IV. Animalium natura, et eorum medica utilitas exacte et lucenter tractantur. Bruxellae, Mommarti, 1639.
Fund for Rare Books.

Browne, John. Myographia nova, sive musculorum omnium. (In corpore humano hactenus repertorum.) Accuratissima descriptio, in sex praelectiones distributa.*** Londini, Redmayne, 1684.
Fund for Rare Books.

Browne, Sir T[homas]. Religio medici. [London] Crooke, 1643.
A true and full coppy (sic) of that which was most imperfectly and surreptitiously printed before under the name of Religio Medici.
Fund for Rare Books.

Brucaeus, Henricus. De scorbutus propositiones. Rastochii, 1589.
Rare first edition.
Horace Magee Memorial Fund.

Burton, J[ohn]. Systeme nouveau et complet de l'art des accouchements, tant theorique que pratique, avec la description des maladies particulieres aux femmes enceintes, aux femmes en couche et aux enfants nouveaux-nés. Traduit de l'anglois par Le Moine. Paris, Herrisant, 1771–1773.
William F. Jenks Fund.

Carr, Richard. Epistolae medicinales variis occasionibus conscriptae. Londini, Anson, 1691.
Fund for Rare Books.

de Castajgne, Gabriel. L'or potable qui guarit de tous maux.*** Paris, Sevestre, 1611.
Contains also his translation of—Le tressor philosophique de la medicine metallique.
Fund for Rare Books.

Ciacconius, Petrus. De triclinio romani: fulvi Ursini appendix. Romae, Ferrarius, 1588.
Extremely rare first edition of an early work.
Fund for Rare Books.

Corp [William]. Essay on the changes produced in the body by operations of the mind. London, Ridgway, 1791.

Fund for Rare Books.

Culpeper, Nicholas. Culpeper's last legacy; left and bequeathed to his dearest wife for the public good; being the choisest and most profitable of those secrets which while he lived were lock'd up in his breast, and resolved never to be published till after his death.*** 6 Impression. London, Blagrave, 1685.

Fund for Rare Books.

Cusanus, Joannes. Algorithmus linealis projectiliu[m]: de i[n]tegris perpulchris arithmetrice artis regulis.*** Vienna, Victor, 1514.

Extremely rare first edition.

Fund for Rare Books.

Da Coreggio, Paolo Grassi. Regionamenti domestici intorno alla natura de'sogni.*** Carpi, Vaschieri, 1613.

Fund for Rare Books.

D'Assigny, Marius. The art of memory; a treatise useful for all, especially such as are to speak in public. 2 Ed. London, Bell, 1699.

Fund for Rare Books.

Davila y Heredia, Don Andrès. Advana de impostores de la medicina, y registro de libros, y papelas de contravando. [Madrid, circa 1675.]

Fund for Rare Books.

Dee, Johannes. True and faithful relation of what passed for many years between John Dee and some spirits.*** Out of the original copy *** in the library of Tho. Cotton, with a preface *** by Meric. Casaubon. London, Maxwell, 1659.

Very rare first edition.

Fund for Rare Books.

Digby, Sir Kenelm. Two treatises; in the one which, the nature of bodies; in the other, the nature of man's soule is looked into. In way of discovery of the immortality of reasonable soules. London, Williams, 1665. 2 v. in 1.

Fund for Rare Books.

Dodonaeus, Rembertus. Frumentorum, leguminum, palustrium et equatilium herbarum, ac eorum, quae eo pertinent, historia. Antverpiae, Plantini, 1566.

Fund for Rare Books.

Döbel, Joh. Henricus. Collegium mnemonicum; oder, Gantz neu eröffnete Geheimnisse der Gedachtniss-Kunst.*** Hamburg, Heyll, 1707.

First edition.

Fund for Rare Books.

Dorn, Gerardus. Fasciculus Paracelsicae medicinae veteris et non novae per flosculos chimicos et medicos.*** Francoforti ad M., Spies, 1581.

Fund for Rare Books.

Du Choul, Jean. Veterum Romanorum religio, castrametatio, disciplina militaris ut et balneae*** è Gallico in Latinum translata. Amstelaedami, apud Janssonio-Waesbergios, 1685.

First Latin edition.

Fund for Rare Books.

d'Emery. Nouveau recueil des secrets et curiositez.*** 7 Ed. Amsterdam, Mortier [1600].

Presented by George W. Norris, M.D.

Epistolae diversorum philosophorum, oratorum, rhetorum sex et viginti; quorum nomina in sequenti invenies pagina. Venetiis, Aldus [1508].

Greek text.

Fund for Rare Books.

Fienus, Thomas. De viribus imaginationis tractatus. Lovanii, Rivius, 1608.

Very rare first edition.

Horace Magee Memorial Fund.

Fienus, Thomas. De viribus imaginationis tractatus. Editio nova. Londini, Danielis, 1657.

Fund for Rare Books.

Finella, Filippo. Nevorum. Antwerp, Plantin, 1632.

Extremely rare first edition of an interesting work on moles.

Fund for Rare Books.

Fontanus, Nicolaus. Florilegium medicum *** opus non dolum medicis verum chirurgia.*** Amstelredami, Bernardi, 1637.

Horace Magee Memorial Fund.

Forestus Alcmarianus, Petrus. De incerto, fallici, urinarum judicio, quo uromantes ad perniciem multorum aegrotantium, utuntur; et qualia illi sint obseruanda, tum praestanda, qui recte de urinis sit judicaturus libri tres. Lugd. Bat., ex officina Plantiniana, 1589.

Fund for Rare Books.

de Freylas, Alonso. Conocimiento, curacuo, y preservaci acio de la peste. A donde se trata lo o han de hazer las ciudades, y governadores dellas, y cada particular vezino en su casa. Jaen, Diaz de Montoya, 1606.

Fund for Rare Books.

Galen, Claudius. Opuscula varia, a Theodoro Goulstono graeca recensita *** et in linguam latinam *** traducta.*** Londini, Badger, 1640.

Text in Greek and Latin in parallel columns.

Fund for Rare Books.

[Gesner, Conrad]. New book of destillation of waters called the Treasure of Euonymus, containing the most wonderful hid secrets of nature, touching the most apt formes to prepare and destil medicines.*** London, Day, 1565.

Fund for Rare Books.

Graindorge, Andre. De natura ignis, lucis, et colorum.*** Cadomi, Yvon, 1664.

Very rare work from a provincial press.

Fund for Rare Books.

Gruel, Walter. Praxis medicinae; or, The physicians practice.*** 2 Ed. London, Norton, 1639.

Fund for Rare Books.

Guybert, Philbert. The charitable physician, with the charitable apothecary. Translated into English.*** By I. W. London, Harper, 1639.

Very rare first edition.

Fund for Rare Books.

Hamand, Henry. Ourography; or speculations on the excrements of urine. With the distinctions, causes, colours, and contents thereof and other symptoms observed in nature.*** London, Englesfield, 1655.

Fund for Rare Books.

Health restor'd, or, The triumph of nature, over physic, doctors, and apothecaries. In twelve entertaining conversations. To which is added, an essay on regimen. London, Torbuck, 1740.

John D. Griscom Fund.

Herdson [Henry]. Ars mnemonica; sive, Herdsonus Bruxiatus; vel Bruxus Herdsoniatus. Londini, Dawson, 1651.

Rare first edition.

Fund for Rare Books.

Hertodt, Joannes Ferdinandus. Crocologia seu curiosa regis vegetabilium enucleatio.*** Jenae, Trescheri, 1671.

Fund for Rare Books.

Heyden, Sir Christopher. Defence of judiciall astrologie, in answer to a treatise lately published by John Chamber. Cambridge, Legat, 1693.

First edition.

Fund for Rare Books.

Hippocrates. Coaca praesagia, opus plane divinum, et verae medicinae tanquam thesaurus, cum interpretatione et commentariis Jacobi Holerii Stempani.*** Lugduni, Rouillius, 1576.

Presented by William T. Johnson, M.D.

Hoffman, Fridericus. Observationum physico-chymicarum selectiorum libri III. Halae, Rengeriana, 1736.

Rare first edition.

Fund for Rare Books.

Huarte Navarro, Juan de Dios. Examens de ingenios. Examination of mens wits in whicch (sic), by discouering the varietie of natures, is shewed for what profession each one is apt, and how far he shall profit therein. Translated out of the Spanish tongue by Camillo Camilli. Englished out of his Italian by R[ichard] C[arew]. London, Islip, 1549.

First English edition.

Fund for Rare Books.

Javellus, Chrysostomius. Epitome *** in universam Aristotelis philosophiam tam naturales qua transnaturalem, nunc ex ipsius auctoriis autographo mendis quamplurimis repurgata.*** Venetiis, Scotus 1552.

Rare and best edition, with marginal notes.

Fund for Rare Books.

Kircher, Athanasius. Magnes; sive, De arte magnetica opus tripartium.*** Coloniae Agrippinae, Kalcoven, 1643.

Fund for Rare Books.

Kyper, Albertus. Institutiones medicae, ad hypothesin de circularis sanguinis motu compositae. Subjunguntur ejusdem transsumpta medica quibus continentur medicinae fundamenta. Amstelodami, Jansson, 1654.

Fund for Rare Books.

Laurentius, Andreas. Opera omnia anatomica et medica ex postrema recognitione, accessione quorundam librorum, qui lucem antea non viderant, locupletata. Francofurti, Rötelij, 1627.

Fund for Rare Books.

Lemnius [Ziriczaeus] Levinus. Occulta naturae miracula. Wunderbarliche Geheimnisse der Natur in des Menschen leibe und Seel*** aus dem Latein in Deutsche Sprach gebracht *** durch Jacobum Horstium. Leipzig, Lantzenberger, 1593.

Fund for Rare Books.

Leveronus, Juvenal. Due discorsi volgari in materia medicina. Turino, de' Bianchi, 1590.

Fund for Rare Books.

Liber trium virorum et trium spiritualium virginum. Parisiis, Stephanus, 1513.

First edition.

Fund for Rare Books.

Lilly, William. Christian astrology modestly treated of in three books. London, Brudenell, 1647.

Fund for Rare Books.

Lombardus, Hieronymus. De natura libri tres.*** Patavii, Pasquatus, 1589.

Very rare first edition.

Fund for Rare Books.

Macasius, Johannes Georgius. Prompturium materiae medicae; sive, Apparatus ad praxin medicam *** editum à Joh. Matthia Nestero. Lipsiae, Michael, 1677.

Fund for Rare Books.

Maderia Arraiz, Duarte. Arbor vitae; or, A physical account of the "Tree of Life" in the Garden of Eden. Translated out of Latine [by Richard Browne]. A piece useful for divines as well as physicians. London, Flesher, 1688.

Fund for Rare Books.

Maior, Joh. Daniel. De inventis â se thermis artificialibus succinatis, ad praecipuos quosdam duos, in sacro Rom: imperio, medicos, epistola praeliminaris. Kiliae Holsatorum, Reumann, 1680.

Fund for Rare Books.

Martini, Mattheaus. De morbis mesenterii abstrusioribus *** item affectionum hypochondriacarum.*** Halae-Saxonum, Oelschlegius, 1625.

Very rare first edition.

Horace Magee Memorial Fund.

Mason, James. Anatomie of sorcery; wherein the wicked impietie of charmers, inchanters, and the such like, is discovered and confuted. London, Legatte, 1612.

Extremely rare first edition of a very interesting and little known book.

Fund for Rare Books.

Mattioli, Pietro Andrea. Dei discorsi nelli sei libri di Pedacio Dioscoride Anazarbeo, della materia medicinale.*** Venetia, Valgrisio, 1585.

Large size wood-cuts.

Fund for Rare Books.

de Mehun, Jean. Le miroir d'alquimie. Traduict de Latin en François, La table d'Esmeraude d'Hermes Trimegiste. Petit commentaire de l'Hortulain dict des Jardins maritimes, sur la d'Esmeraude d'Hermes Trimegiste. Le livre des secrets d'alquimie de Calid.

Roger Bachon. De l'admirable puissance de l'art et de nature traduict de Latin en François par Jacques Girard de Tournus. Paris, Seveste, 1613.

Very rare second French edition.

Fund for Rare Books.

Mercurialis, Hieronymus. De arte gymnastica libri sex, in quibus exercitationum omnium vetustarum genera, loca, modi, facultates, et quidquid deniq. ad corporis humani exercitationes pertiner, diligenter explicatur. 2 Ed. Venetiis, Junta, 1573.

Fund for Rare Books.

Mesue [Damascenus, Joannes]. Summula Jacobi de partibus per alphabetum super plurimis remediis ex ipsius Mesue libris excerptis. Lugduni [1523].

Fund for Rare Books.

Mexia, Pedro. Dialoghi, tradotti nouvamente di spagnuolo in volgare da Alfonso d'Ulloa.*** Venetia, Pietrasanta, 1557.

Rare first Italian edition.

Fund for Rare Books.

Nabod, Valentinus. Enarratio elementorum qua praetur Alcabicii, qui Arabum doctrinam compendio prodidit.*** Coloniae, Berkmanni, 1560.

Very rare first edition.

Fund for Rare Books.

Naude, Gabriel. Apologié pour tous les grands personnages qui ont esté faussement soupçonnez de magie.*** La Haye, Vlac, 1653.

Fund for Rare Books.

Omar. Liber de nativitatibus et interrogationibus. Venetiis, Sessa, 1503.

Excessively rare first edition.

Fund for Rare Books.

ab Orto, Garcia. Aromatum et simplicium aliquot medicamentorum apud Indos nascentium historia *** illustrate à Carolo Clusi.*** 4 Ed. Antverpiae, Plantin, 1593.

Fund for Rare Books.

Paracelsus [Bombastus ab Hohenheim], Aureolus Philippus Theophrastus. His dispensatory and chirurgery. The dispensatory; contains the choisest of his physical remedies, and all that can be desired of his chirurgery, you have in the treatises of wounds, ulcers and aposthumes. Faithfully Englished, by W. D. London, Chetwind, 1656.

Presented by George W. Norris, M.D.

Pharmacopoeia pauperum; or, The hospital dispensatory; containing the medicines used in the hospital of London. By the direction of Coatsworth [et al.]. London, Warner, 1817.

Fund for Rare Books.

de Planis Campy, David. Traicté de la vraye, unique, grande et universelle medecine des anciens; dite des recens or potable.*** Paris, Targa, 1633.

Rare first edition.

Fund for Rare Books.

Read [Alexander]. Chirurgorum comes; or, The whole practice of chirurgery.*** Completed by a member of the College of Physicians of London. London, Jones, 1687.

Horace Magee Memorial Fund.

Rhazes, Abu Bekr Muhammad Ben Zakhariah Abrazi. Libellus de peste, de graeco in latinum sermonem versis per Nicholaum Macchellum. Venetiis, Arrivabenus, 1555.

Fund for Rare Books.

Rich closet of physical secrets, collected by the elaborate paines of four several students in physick, and digested together.*** London, Dawson [1659].

Rare and curious collection.

Fund for Rare Books.

Riverius, Lazarus. Praxeos medicae libri septem posteriores. Lugduni, Huguetan, 1653.

Fund for Rare Books.

Rowzee, Lodwick. Queens wells, that is a treatise of the nature and vertues of Tunbridge water; together with an enumeration of the chiefest diseases, which it is good for, and against which it may be used, and the manner and order of taking it. London, Boulter, 1671.

Fund for Rare Books.

Russell, Richard. De tabe glandulari, sive de usu aquae marinae in morbis glandularum dissertatio. Oxonia, Fletcher, 1750.
John D. Griscom Fund.

Sala, Angelo. Opera medico-chymica quae extant omnia.*** Ed. postrema.*** Rothomagi, Berthelin, 1650.
Fund for Rare Books.

Salernum, School of. Regimen sanitatis Salerni accurate castigatum adiecta tabula in calce libri hactenus non impressa. Lugduni, Trot, 1516.
Fund for Rare Books.

de Sancto Nazario, Jo. Franciscus. [Tractatus de peste.] Avenioni, Johannes de Channey, 1522.
Fund for Rare Books.

Scaliger, Julius Caesar. Epistolae et orationes.*** Lugd. Bat., ex off. Plantiniana, 1600.
First edition, contains letters of medical interest.
Fund for Rare Books.

Schott, Gaspar. Physica curiosa; sive, Mirabilia artis, libris XII. comprehensa.*** Herbipoli, Hertz, 1697.
Best edition of an important encyclopedia in 17th century.
Fund for Rare Books.

Scot, Reginald. Discovery of witchcraft; proving that the compacts and contracts of witches with devils and spirits and all infernal spirits or familiars, are but erroneous novelties and imaginary conceptions.*** London, Clark, 1665.
Fund for Rare Books.

Stobnicensis, Joannes. Parvulus philosophie naturalis (Aristotelis) cum expositione textuali ac dubiorum magis necessariorum dissolutione ad intentionem Scoti congesta. Cracouie, Haller, 1507.
Extremely rare first edition, written by the compiler of the Intro. Cosmogr. which contains the earliest known map of America.
Fund for Rare Books.

Strother, Edward. Euodia; or, A discourse on causes and cures. In two parts; first part contains a short and easy method, how to discover

the causes of any disease. The second, gives plain instructions how to proceed in the cure of all, but more particularly complicated diseases. London, Rivington, 1718.

Fund for Rare Books.

Thomson, George. Galen-pale; or, A chymical trial of the Galenists.*** London, Thomas, 1665.

Fund for Rare Books.

Topsell, Edward. History of foure-footed beasts. Describing the true and lively figure of every beast, with a discourse of their severall names, conditions, kinds.*** London, 1607.

*First edition. Contains also his—History of serpents.*** 1608.*

Fund for Rare Books.

Topsell, Edward. History of serpents; or, The second booke of living creatures; wherein is contained their divine, natural, and morall descriptions.*** London, 1608.

*First edition. Bound with his—History of foure-footed beasts.*** 1607.*

Fund for Rare Books.

Turner, Joan[nes]. De febre Britannica anni 1712 schediasma. Londini, Woodward, 1713.

Horace Magee Memorial Fund.

Tyrius, Maximus. Sermones e graeca in latinam linguam versi Cosmo Paccio interpreti. Rome, Mazochius, 1517.

First Latin edition. The remarkably fine border around the title is one of the most beautiful woodcuts issued from the early Roman presses.

Fund for Rare Books.

Valerianus, Joannes Pierius. Hieroglyphica; seu, De sacris Aegyptiorum, *** item hieroglyphicorum, emblematumque medicorum, *** authore Ludovico a Casanova. Lugduni, Frellon, 1626.

Fund for Rare Books.

Vicary, Thomas. Surgeons directorie, for young practitioners, in anatomie, wounds, and cures, etc., shewing the excellencie of divers secrets belonging to that noble art and mysterie. Very usefull in these times upon any sodaine accidents, and may well serve as a noble exercise for gentle women and others.*** London, Fawcet, 1651.

Fund for Rare Books.

Viviani, Viviano. De peste sive *** apologia syllogisticae disputationis editae anno MDCXXX. Mense Augusti. Venetiis, Sarzina, 1632.

Fund for Rare Books.

Willis, Thomas. De anima brutorum, quae hominis vitalis ac sensitiva est, exercitationes duae, prior physiologica ejusdem naturam, partes, potentias et affectiones tradit.*** Coloniae, de Tournes, 1680.

*Contains also his—Pharmaceutice rationalis sive diatribae de medicamentorum.*** 1677.

Fund for Rare Books.

Willis, John. Mnemonica; or, The art of memory, drained out of the pure fountains of art and nature. Also, a physical treatise of cherishing natural memory.*** London, Sowersby, 1661.

Rare first edition.

Horace Magee Memorial Fund.

Zarabella, Jacobus count. De rebus naturalibus libri XXX. Quibus quaestiones quae ab Aristotelis interpretibus hodie tractati solent, accurate discutiuntur. Venetiis, Meietus, 1590.

MSS. notes in a 17th Century hand.

Fund for Rare Books.

Manuscripts

Aegidius Columna. De regimine principum. [Roma, 1300.]

Early 14th century manuscript.

Fund for Rare Books.

Arnoldus de Villanova. Liber de conservatione sanitatis.

Important manuscript on vellum written carefully in red and black in two columns, executed in Italy in the early XIVth Century. Text agrees with that of the first treatise (Hain 1817).

Horace Magee Memorial Fund.

Gringore, Pierre. La coqueluche. [Paris, Le Drue, 1510.]

Gothic manuscript on vellum from the copy in the Bibliotheque nationale by Fyot. The only perfect copy of this work by the famous French poet and politician exists in the Rothschild collection.

Fund for Rare Books.

Layfielde, Anne. Manuscript recipes; a very interesting MS. volume of medical and household recipes, with inscription on flyleaf, "Anne Layfielde, her book of physicke and surgery, 1640." [London, 1640.]

The entries are in various hands and extend to perhaps 100 years later.

Fund for Rare Books.

[Picard, Jean Baptiste]. [Manuscrit sur la medecine et la chirurgie.] [Paris, 1823–1831.]

Manuscript notes on medicine and surgery.

Fund for Rare Books.

Sennert [Daniel]. Medicinarum u[til]itatissimarum.*** [London, 1700.]

Manuscript ingeniously illustrated.

Fund for Rare Books.

Other Interesting Additions

A Holograph letter of Benjamin Rush, and one of William Shippen, presented by Dr. Robert Abbe.

A "Notice of the Summer Courses 1899 held at the old Charité in Berlin by Virchow, with notes and signature of Rudolf Virchow," framed, presented by Dr. Guthrie McConnell.

Fragment of John Hunter's handwriting, presented by the late Dr. J. C. Reeve, Dayton, Ohio.

"Copiae" William Penn's letter dated "Windsor, 16th of July 1688" to the Govvernor and his friends, presented by Dr. John B. Roberts.

A photograph of the memorial monument erected to the memory of Ephraim McDowell by the Kentucky State Medical Society in Danville 1879, presented by Dr. August Schachner.

A "loving cup given to the late Dr. H. C. Wood by his friends and pupils, November 6, 1902," presented by Dr. H. C. Wood, Jr.

We have also received during the year a number of interesting and more or less valuable autograph letters.

The Photostat has been in operation on the stated days, Wednesday and Friday, for the same period of time as during the preceding year. There have been furnished to Fellows and others, on application, 320 prints. The work for the Library has been continued according to the original instructions of the Committee.

7056 large and small prints have been made and 23 volumes of incunabula completed. Also a number of portraits and valuable manuscripts. Documents that were fading out from exposure to light were copied, the originals being preserved in envelopes in the steel manuscript cases and the photostat copies exhibited in their place.

Up to the present time there have been made copies of 124 incunabula.

During the year there has been an increase in the number of new publications received: 253.

The following table is of interest, in a way, showing the variation in the number of new books received from 1915 on. At the beginning of this year an open order was given to agents in England France, Italy, Germany and Spain for all medical books and monographs published during 1920. Periodical publications, reprints and translations not included. The result of this order, according to the figures in the table, shows a considerable increase in the publications from Great Britain and a like increase in the number of new books from Germany, in comparison with the year 1915. The small number of books received from France requires some explanation; information on the subject has been requested from our Agents in Paris but up to the present time no answer has been received. No books have been received direct from Italy and no response made to our several inquiries. From Spain nine books have been received. The decrease in the publications of the United States is accounted for, to a certain extent, from the fact that the cost of paper is so high that fewer books have been accepted for publication.

	1920.	1919.	1918.	1917.	1916.	1915.
United States	274	357	506	456	425	283
Great Britain	270	164	154	121	161	100
France	44	152	96	144	15	8
Germany	330	...	4	20	90	175
Other countries	22	14	10	23	43	8
	940	687	780	764	734	574

There was an increase to the principal of the Library Endowment Funds during the past year of $111.15, but practically no additions. The total of the Library Endowment Funds at this date is $357,398.59.

An account of stock has been taken in connection with the shelf-list and but one book found to be missing.

Rausse, J. H. Ueber die gewöhnlichsten ärztlichen Missgriffe beim Gebrauch des Wassers als Heilmittel. 267 pp. 16°. Zeitz, Schieferdecker, 1847.

A number of discrepancies reported in connection with the periodicals is now being investigated.

There has been a marked increase in the use of the Library over the preceding year: Visitors 1869—Books consulted 6013—and Books taken out 1727. This is the best showing since 1916 and would seem to indicate that conditions generally are returning to normal. There is also a considerable increase in the number of volumes bound; this is accounted for, however, by the number of back volumes of German periodicals completed during the year. Economy in binding is necessary at present prices and, therefore, only the periodical publications and new books, received from abroad, are sent to the binders.

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